Energy Savings Opportunity Survey Energy Engineering Analysis Program (EEAP) Fort Campbell, Kentucky

Final Report - Phase I

Volume 1 Sections 1-4

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SYSTEMS ENGINEERING AND MANAGEMENT CORPORATION



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1.1 SYNOPSIS

Systems Corp surveyed and completed energy analyses for 98 buildings, fifteen chiller plants, and roadway lighting. The energy conservation opportunities (ECOs) evaluated were lighting efficiency improvements, instantaneous water heaters, heat recovery from hot refrigerant gases, absorption chiller replacements, and ground water coupled heat pumps. Cost estimates were prepared using M-CACES. Life cycle cost analyses were performed using the Life Cycle Cost in Design (LCCID) computer program. Project development brochures (PDBs) and DD1391 forms were prepared for Energy Conservation Investment Program (ECIP) projects. The projects that were developed represent \$2,257,000 in annual savings with favorable simple paybacks and saving to investment ratios (SIRs).

1.2 INTRODUCTION

Systems Engineering and Management Corporation (Systems Corp) was contracted by the Louisville District of the United States Army Corps of Engineers in June 1993 to perform an energy savings opportunity survey (ESOS) for 98 buildings at Fort Campbell, Kentucky. In addition, the project includes an exterior lighting survey of 5 locations around the facility and a comprehensive survey of 15 chillers serving 57 buildings on the Post.

1.2.1 Scope of Work

- 1. Evaluated selected energy conservation opportunities (ECOs) to determine their energy savings potential and economic feasibility.
- Conduct a limited site survey of selected buildings or areas to insure that
 any methods of energy conservation which are practical and have not been
 evaluated in any previous energy study have been considered and the
 results documented.
- 3. Determine efficiency of existing chillers. Determine the replacement option with the highest SIR.
- 4. Provide complete programming or implementation documentation for all recommended ECOs.

1 EXECUTIVE SUMMARY

5. Prepare a comprehensive report to document the work performed, the results, and the recommendations.

1.2.2 Organization of the Final Report

The submitted material for this report consists of the following:

Energy Savings Opportunity Survey Energy Engineering Analysis Program (EEAP) Fort Campbell, Kentucky

Volume 1: Sections 1 - 4

Volume 2: Section 4 (continued)

Volume 3: Sections 5 - 15

1.3 PRESENT AND HISTORICAL ENERGY CONSUMPTION

The baseline energy consumption and energy conservation opportunity energy consumption were determined using speadsheets and manual calculating to model system energy consumption. These have been included in *Section 2* of this report.

1.3.1 Natural Gas Costs

The natural gas consumption and cost for the 12 months (July 1992-June 1993) at Fort Campbell are shown in *Table 1.3.1*, Fort Campbell Natural Gas. Figure 1.3.1 is a bar graph of the monthly consumption and costs. The natural gas cost used for evaluating the ECOs is as follows:

COST/MCF = \$3.41/MCFCOST/MBTU = \$4.00/MBTU

FORT CAMPBELL NATURAL GAS

3.61 3.41	771,339 429,040	213,900 213,900 122,873	Max Avg
3.08	168,963	54,771	Min
3.49	\$5,148,485	1,474,481	TOTAL
3.47	222,479	64,113	Jun
3.60	219,255	60,884	May
3.58	419,168	116,968	Apr
3.58	699,147	195,479	Mar
3.61	771,339	213,900	Feb
3.61	710,486	196,833	Jan 53
3.58	722,174	201,521	Dec
3.59	522,621	145,408	Nov
3.08	238,456	77,298	Oct
3.08	168,963	54,771	Sept
3.08	214,724	69,605	Ang
3.08	\$239,700	77,701	Jul 92
COST/MCF	COST	MCF	MONTH

Jul Aug Septoct Nov Dec Jan Feb Mar Apr May Jun FORT CAMPBELL ESOS Natural Gas July 92 - June 93 000,009 200,000 100,000 500,000 400,000 700,000 300,000 800,000 ☐ WCŁ Cost (Dollars)

1.3.2 Electric Costs

The electric energy consumption, demand, and costs for the past 12 months (July 1992-June 1993) are shown in *Table 1.3.2 Fort Campbell Electric. Figure 1.3.2* is a bar graph of the monthly consumption and cost. The electric cost used to calculate the electric cost savings for the project is as follows:

COST/KWH = \$0.02114/KWH (No Demand) COST/MBTU = \$6.19/MBTU (No Demand) COST/KW = \$11.78/KW (Monthly Demand)

1.4 ENERGY CONSERVATION OPPORTUNITIES INVESTIGATED

Systems Corp analyzed five energy conservation opportunities (ECOs) at Fort Campbell, Kentucky. The analysis was performed utilizing energy models developed by Systems Corp and data collected during the field survey of the facilities at Fort Campbell. Each ECO was evaluated to determine the potential energy savings, dollar savings, implementation costs, simple payback, life cycle cost, and savings to investement ratio (SIR). The five ECOs that were evaluated are as follows:

ECO - 1 Instantaneous hot water heaters

ECO - 2 Ground water coupled heat pumps

ECO - 3 Refrigerant heat reclaim

ECO - 4 Replace chillers with high efficiency chillers

ECO - 5 Improve lighting efficiency

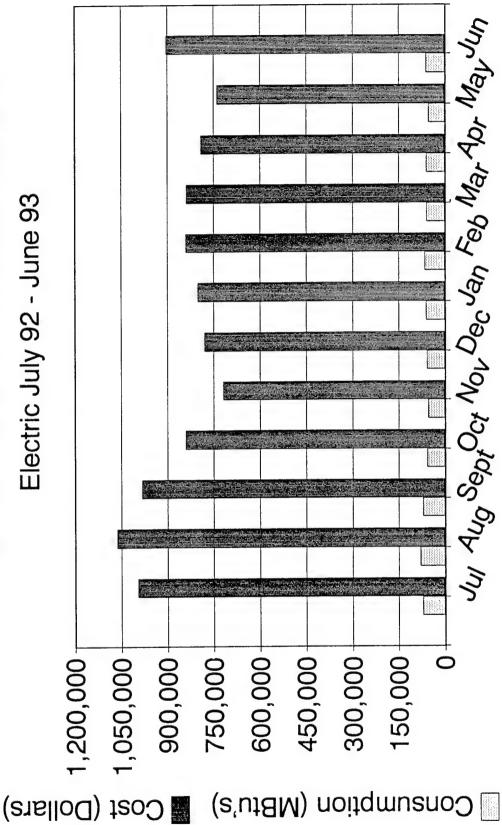
Systems Corp's energy analysis models were used to determine the savings achieved for implementing each ECO in the facilities that were evaluated. The U.S Army Corp of Engineers M-CACES software was used to estimate the implementation cost of each ECO in each facility evaluated. The U.S Army Corp of Engineers Life Cycle Cost in Design, Version 1.0, Level 72, software was used to perform life cycle cost analyses and determine the SIR of each ECO for each facility evaluated.

FORT CAMPBELL ELECTRIC

MONTH	DEMAND KW	DEMAND COST	CONSUMPTION KWH	CONSUMPTION COST	COST DEM & CONS	COST/KWH
Jul 92	45,171	\$532,114	21,096,600	\$464,810	\$996,924	.047
Aug	45,927	541,020	23,818,200	523,607	1,064,627	.045
Sept	43,697	514,751	21,319,200	469,265	984,016	.046
Oct	39,425	464,427	17,047,800	376,277	840,704	.049
Nov	31,072	366,028	16,077,600	353,458	719,486	.045
Dec	34,020	400,756	17,287,200	380,190	780,946	.045
Jan 93	33,907	299,424	18,320,400	402,420	801,844	.044
Feb	35,381	416,788	19,307,400	424,019	840,807	.044
Mar	38,140	449,289	17,644,200	388,828	838,117	.048
Apr	33,944	399,860	17,808,000	391,392	791,252	.044
May	34,663	408,330	15,691,200	331,712	740,042	.047
Jun	43,697	514,751	18,429,600	389,601	904,352	.049
TOTAL	459,044	\$5,407,588	223,847,400	\$4,895,579	\$10,303,117	.046
Min	31,072	356,028	15,691,200	331,712	719,486	,044
Max	45,927	541,020	23,818,200	523,607	1,064,627	.049
Avg	38,254	450,628	18,653,950	407,965	858,593	.046

FORT CAMPBELL ESOS

Electric July 92 - June 93



1.4.1 ECOs Recommended

Sytems Corp recommended that the following ECOs be implemented due to favorable simple pay backs and savings investment ratios (SIRs).

- ECO 2 Ground water coupled heat pumps
- ECO 3 Refrigerant heat reclaim
- ECO 4 Replace chillers with high efficiency chillers
- ECO 5 Improve lighting efficiency

1.4.2 ECOs Rejected

ECO-1, Instantaneous Water Heaters, was rejected due to the fact that the potential energy savings was found to be quite small for each building that was evaluated. The implementation costs for each building evaluated did not represent a large investment, but when compared to the savings resulted in simple paybacks in excess of twenty years. Replacing the water heater systems did not yield an acceptable simple payback in any of the buildings evaluated.

1.4.3 ECIP Projects Developed

Systems Corp developed three ECIP projects. The projects include the replacement of 12 absorption chillers serving Korean war era barracks with natural gas engine driven screw chillers, the improvement of lighting efficiency in 38 buildings, and the installation of ground water coupled heat pumps in 770 military family housing units. The project information, including DD1391's, for each project are included in Sections 3 (Chillers), 4 (Lighting), and 5 (GWCHP). The following table summarizes the savings and investment for each project.

TABLE 1.4.3 ECIP PROJECT SUMMARY

		1st Yr Savings	Investment	SIR	SPB (yrs)
ECIP-1	Chillers	\$1,336,609	\$4,115,522	6.87	2.92
ECIP-2	Lighting	\$142,057	\$1,073,612	1.48	7.56
ECIP-3	GWCHP	\$674,606	\$4,837,740	1.15	7.17
	TOTAL	\$2,153,272	\$10,026,874	3.53*	5.47*

^{*}These numbers are weighted averages to show representative values for a total life cycle cost analysis.

1.4.4 Non-ECIP Projects Developed

Systems Corp developed 2 projects that did not qualify for ECIP funding due to not meeting the \$300,000 investment criteria. The 2 projects are heat reclaim from hot refrigerant gases at the Commissary and improved lighting efficiency in non-appropriated fund facilities.

TABLE 1.4.4

	1ST YR SAVINGS	INVESTMENT	SIR	SPB
HEAT RECLAIM	\$2,233	\$ 19,240	1.86	8.62
NAF LIGHTING	12,493	87,822	1.59	7.03
TOTAL	\$ 14,726	\$ 107,062	1.63*	7.32*

^{*}These numbers are weighted averages to show representative values for a total life cycle cost analysis.

2.1 FIELD SURVEY

The field survey as performed by SYSTEMS/CORP was designed to provide the necessary data required to complete the project. It was also designed to provide residual benefits to the installation by providing an organized and readily available source of information which can be used in future years. The information was transmitted in the form of field notes made on standardized survey forms. The field survey forms were submitted with the interim report.

The survey forms were designed to allow notations of all data which could be utilized (not necessarily required) to calculate the energy savings gained by implementing a specific energy conservation opportunity. These forms contain data obtained from as-built drawings and confirmed in the field as well as data obtained only in the field.

2.1.1 Buildings

Thorough preparation for the building survey was required to assure that the data required to perform the technical analysis is obtained. The building surveys were performed in a manner which assured the best results. A simple listing of each step of the process best describes our approach to the surveys.

- 1. The list of ECOs included in the work scope were reviewed in detail.
- 2. Each ECO was given an identification number which is used consistently throughout this project.
- 3. An expanded description of each ECO was formulated to outline the possible methods for implementation of the ECO.
- 4. Survey forms were developed for each ECO to provide space to enter and data which might possibly be used in performing the engineering and economic analysis of the ECO.
- A list of the types of as-built drawings required for the buildings was prepared based on the information required on the ECO survey forms.
- 6. A SYSTEMS/CORP representative assisted during the survey in gathering the necessary as-built drawings.
- 7. Due to the age of drawings, it was determined that most required information would need to be gathered during the survey at the buildings.
- 8. The building surveys were then performed, confirming or revising data obtained from the drawings. Additional data was obtained as required.
- 9. The Exit Interview was scheduled.

Table 2.1.1.1 is a list of the buildings surveyed sorted by building type.

TABLE 2.1.1.1

BUILDINGS SURVEYED

BU	JILDING TYPE: ADMINISTRA	ATIVE
BUILDING NUMBER	BUILDING FLOORS	BUILDING AREA
2745	1	13249
3207	1	2551
3210	1	2581
3307	1	2816
3308	1	2257
6254	3	9338
6708	1	2581
6713	1	3610
6715	2	1892
6717	1	2581
6720	1	4892
6723	_11	3610
6729	1	3610
6734	1	3610
6735	1	2746
6736	1	2581
6737	1	2581
6738	1	2581
6773	1	2581
6784	1	2581
6789	1	3610
6790	1	3610
6901	3	9303
6904	1	2581
6905	1	2581
6906	1	2581
6907	1	2581
6908	1	2581
6913	1	2581
6914	1	3610
6916	1	2581

7543

TABLE 2.1.	1.1
BUILDINGS SURVE	YED
BUILDING TYPE: ADMINISTRA	TIVE (CONT.)
BUILDING FLOORS	BUILDING AREA
1	2581
1	3610
1	2581
1	2581
1	3610
1	3610
1	2581
2	14280
	BUILDINGS SURVE BUILDING TYPE: ADMINISTRA BUILDING FLOORS 1 1 1 1 1 1 1 1 1

1

TOTAL AREA THIS TYPE: 170159

998

	TABLE 2.1.1. BUILDINGS SURVEYE	
BUILDING	BUILDING	BUILDING
NUMBER	FLOORS	AREA

	BUILDING TYPE: ARTS AND C	RAFTS			
89 1 11545					
	TOTAL AREA THIS TYPE: 1	1545			

]	BUILDING TYPE: CHILLER P	LANT		
6921	6921 1 1470			
	TOTAL AREA THIS TYPE:	1470		

В	UILDING TYPE: CLASSRO	ООМ
5661	1	22480
5740	2	14173
6390	1	12792
6740	1	4141
6744	1	7200
6991	1	3688
6993	1	3688
6995	1	3688
6997	1	3567
	OTAL AREA THIS TYPE: 7	75417

	BUILDING TYPE: COM	IMISSARY
2702	1	104978
	TOTAL AREA THIS TY	PE: 104978

В	UILDING TYPE: COMMUNICA	TIONS
95	3	21864
	TOTAL AREA THIS TYPE: 2	1864

	ΓABLE 2.1.1.1	
В	UILDINGS SURVEYED	
BUILDING NUMBER	BUILDING FLOORS	BUILDING AREA

В	JIDLING TYPE: CONFERENCE CE	NTER
3209	1	3598
	TOTAL AREA THIS TYPE: 3598	

BUIL	DING TYPE: DATA PROCES	SING
7541	1	8908
Т	OTAL AREA THIS TYPE: 890	8

BUILD	ING TYPE: DAY CARE CE	NTER
4601	1	
	TOTAL AREA:	

BUIL	DING TYPE: GUARD HOU	SE
7574	1	325
TO	TAL AREA THIS TYPE: 325	5

H	BUILDING TYPE: LIBRARY	
38	1	16038
ТО	TAL AREA THIS TYPE: 16038	

BUILD	ING TYPE: MAINTENANCE SH	IOPS
6087	1.5	10768
6302	1	5615
6304	1	5385
6306	1	3108
6308	1	5385
7562	1	1800
7	TOTAL AREA THIS TYPE: 32061	

T	ABLE 2.1.1.1	
BI	JILDINGS SURVEYED	
BUILDING NUMBER	BUILDING FLOORS	BUILDING AREA

В	UILDING TYPE: MEDICAL	
3208	1	3598
6714	1	2686
6903	1	3867
6915	1	3610

BUILDING TYPE: MUSEUM			
5702	1		14000
	TOTAL AREA THIS	TYPE: 14000	

	BUILDING TYPE: MUSIC	
3202	1	13381
TO	OTAL AREA THIS TYPE: 13381	

BUILDING TYPE: POST OFFICE			
91	1	12873	
	TOTAL AREA THIS TYPE: 12873		

	BUILDING TYPE: RECREATION			
3411		1	20918	
	TOT	AL AREA THIS TYPE: 20918		

BU	JILDING TYPE: RELIGIOUS	
7514	1	4064
то	TAL AREA THIS TYPE: 4064	

	TABLE 2.1.1.	1
BUILDINGS SURVEYED		
BUILDING NUMBER	BUILDING FLOORS	BUILDING AREA

	BUILDING TYPE: SIMULATO	OR .		
6088	1	4988		
	TOTAL AREA THIS TYPE: 4988			

BUILDING TYPE: THEATRE				
93	2	17497		
TOTAL AREA THIS TYPE: 17497				

BUILDING TYPE: TRANSPORTATION				
2699	1	3319		
	TOTAL AREA THIS TYPE: 3319			

В	UILDING TYPE: TROOP SER	RVICES
6140	1	5867
6902	1	3867
	TOTAL AREA THIS TYPE:	9734

В	UILDING TYPE: WAREHO	DUSE
5207	1	169375
5210	1	8678
5212	1	10880
5216	1	30000
7855	11	10815
7856	1	9607
TOTAL AREA THIS TYPE: 317385		

2.1.2 Exterior Lighting

The exterior lighting survey was performed in much the same way as the building survey. The approach for the exterior lighting survey was to survey the specified locations on the post. A listing of the steps required to complete this task are as follows:

- 1. The ECO was reviewed in detail and given an identification number.
- 2. An expanded description of the ECO was formulated to outline the possible methods of implementation.
- 3. A survey form was developed.
- 4. Site maps were reviewed and survey locations were identified.
- 5. A preliminary site survey was performed to establish fixture distances, mounting height and area types.
- 6. Sketches of the locations and preliminary data were prepared for field notes.
- 7. Lamp wattage information was obtained from the electrical maintenance staff.
- 8. A daylight survey of each location was performed to identify fixture and lamp types, wattages and voltages.
- 9. A nighttime survey was performed to measure light levels at each of the surveyed locations.

Table 2.1.2.1 is a listing of the areas surveyed for exterior lighting.

TABLE 2.1.2.1					
LIST OF	LIST OF EXTERIOR LIGHTING SURVEY LOCATIONS				
	TVI MVILL			EYED	
AREA NUMBER				100W HPS	
1	PIERCE VILLAGE	3	66	8	
2	LaPOINTE VILLAGE	13	18	2	
3	HAMMOND HEIGHTS	0	57	70	
4	LEE VILLAGE	4	124	0	

2.1.3 Family Housing

2

The survey for family housing consisted of six existing electric heat pumps in four family housing areas. The six units will be used to represent 770 family housing units. During the survey the following information was gathered:

- 1. Manufacturer, model, and serial numbers for indoor unit.
- 2. Manufacturer, model, and serial numbers for outdoor unit.
- 3. Unit Tonnage.
- 4. Number of similar units in area.

The data gathered was used to establish the energy efficiency ratio (EER) of the units. Table 2.1.3.1 lists the areas surveyed in family housing.

TABLE 2.1.3.1			
AREAS SURVEYED FOR ECO - 2: GROUND WATER COUPLED HEAT PUMPS			
AREA NUMBER	AREA NAME	BUILDING NUMBER	UNIT TYPE
1	La POINTE VILLAGE	4233	4 OR 6
2	HAMMOND HEIGHTS	4980	3 OR 4
3	DRENNON PARK	1153	DUPLEX
3	DRENNON PARK	1164	SINGLE

2.1.4 Chillers

The survey of the chillers consisted of fifteen single stage steam driven absorption chillers serving the Korean War era barracks in the 3200, 6700 and 6900 areas. During the survey the following information was gathered by on-site visual inspections, review of maintenance records, review of design documents, review of manufacturers submittals and measurements of operating characteristics.

- 1. Manufacturer, model and serial numbers.
- 2. Steam pressure and flow.
- 3. Condenser water flow, pressure drop and temperature rise.
- 4. Chilled water pump data.
- 5. Condenser water pump data.

The data gathered was used to determine the current operating characteristics of the existing chillers including the coefficients of performance. The data collected was more than adequate to evaluate the energy conservation opportunities.

Table 2.1.4.1 lists the buildings surveyed for chiller replacement.

TABLE 2.1.4.1

CHILLERS SURVEYED FOR ECO - 4: REPLACE ABSORPTION CHILLERS WITH HIGH EFFICIENCY UNITS

BUILDING BUILDING BUILDING CHILLER CAPACITY YEAR				
NUMBER	FLOORS	AREA	(TONS)	INSTALLED
3213	3	42627	140	1979
3214	3	42647	250	1977
6711	3	38329	360	1976
6718	3	31869	140	1976
6726	3	38160	360	1976
6732	3	38442	300	1976
6774	3	31953	90	1976
6776	3	38152	320	1977
6781	3	37904	320	1975
6910	3	38089	320	1975
6921A	1	1470	570	1975
6929	3	38281	320	1975
6936	3	31735	160	1975
6938	3	38039	320	1975
6944	3	38063	380	1974

TOTALS: 525740 4350

2.2 CALCULATIONS

Energy calculations were performed using both manual and computerized techniques. Due to the large volume of calculations to be performed using both methods, standardized procedures were developed for both computer models and the hand calculated models. This assured consistent results and uniformity of quality in all of the calculations performed.

2.2.1 Baseline Energy Consumption

The following sections will describe the method for calculating the baseline energy consumption for each of the five ECOs.

2.2.1.1 Baseline Energy Consumption: ECO - 1 (Instantaneous Water Heaters)

The baseline energy consumption for this ECO was calculated by developing a LOTUS123 spreadsheet which represented all areas of energy consumption. The following areas represent the major sources of energy consumption for the current domestic hot water system:

- 1. Consumption the initial heating of the inlet cold water.
- 2. Storage losses heat loss from storage tank.
- 3. Line losses heat loss from hot water lines.
- 4. Temperature additional energy consumption due to improper temperature setting.

2-14

These items were calculated using manufacturer's data and measurements taken in the field.

Table 2.2.1.1.1 lists the baseline energy consumption for this ECO.

TABLE 2.2.1.1.1

BUILDING BASELINE ENERGY CONSUMPTION
ECO - 1: INSTANTANEOUS WATER HEATERS

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
38	448.95
89	154.42
91	332.36
95	316.44
2699	72.77
2745	194.07
3202	322.85
3207	55.76
3208	2.31
3209	16.78
3307	52.81
3308	26.14
3411 .	158.00
4601	5.24
5207	1841.08
521	11.14
5212	56.78
5216	3.59
5661	392.87
5702	90.34
5740	26.00
6087	742.42
6088	174.38
6140	70.92
6254	200.57
6302	59.44
6306	59.55
6306	76.80

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
6308	90.51
6390	211.91
6708	57.29
6713	49.31
6714	43.64
6715	176.50
6717	32.40
6720	127.32
6723	52.08
6729	45.38
6734	5.24
6735	N/A
6736	4.38
6737	5.66
6738	2.99
6740	N/A
6744	N/A
6773	3.15
6784	5.79
6789	3.62
6790	1.23
6901	11.57
6902	13.77
6904	2.84
6905	N/A
6906	N/A
6907	3.04
6908	2.68

TABLE 2.2.1.1.1 BUILDING BASELINE ENERGY CONSUMPTION

ECO - 1: INSTANTANEOUS HOT WATER HEATERS

BUILDING NUMBER	BASELINE ENERGY CONSUMPTION (MBTU)
6913	4.17
6914	2.80
6915	3.85
6916	1.81
6924	4.58
6924	4.58
6924	3.31
6924	3.31
6925	3.79
6926	2.83
6932	N/A
6934	5.70
6935	6.79
6991	N/A
6993	2.45
6995	2.57
6997	3.91
7510	327.11
7855	N/A
7856	N/A

TOTAL MBTU: 7300.64

2.2.1.2 Baseline Energy Consumption: ECO - 2 (Ground Water Coupled Heat Pumps)

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. This spreadsheet modeled the energy consumption of the existing electric heat pumps. The energy consumption was modeled using manufacturer's data on the existing units and weather bin data. The baseline consumption was calculated for all the different unit types and sizes by utilizing different values of EERs for the different units. The following table lists the baseline for each family housing area.

TABLE 2.2.1.2.1		
BASELINE ENERGY CONSUMPTION ECO - 2 GROUND HEAT PUMPS		
AREA NUMBER	AREA NAME	BASELINE ENERGY CONSUMPTION (MBTU)
1	La POINTE	13181
2	HAMMOND HEIGHTS	26363
3	DRENNON PARK	21044
3	DRENNON PARK	925

TOTAL MBTU: 61513

2.2.1.3 Baseline Energy Consumption: ECO - 3 (Refrigerant Heat Reclaim)

The baseline energy consumption for this ECO was calculated by hand. The recovered heat from the refrigeration equipment will be used to heat domestic hot water. The baseline energy consumption therefore is the energy consumed by the existing water heaters.

Building 2702

298 MBTU

2.2.1.4 Baseline Energy Consumption: ECO - 4 (Replace Absorption Chillers with High Efficiency Units

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. This spreadsheet modeled the energy consumption of the existing chillers by utilizing manufacturer's data (COP of the unit), field measurements, and weather bin data. The following table lists the baseline energy consumption for each building.

TABLE 2.2.1.4.1

CHILLER BASELINE ENERGY CONSUMPTION

ECO - 4: REPLACE CHILLERS WITH HIGH EFFICIENCY UNITS

BUILDING NUMBER	BUILDING AREA	BASELINE ENERGY CONSUMPTION (MBTU)
3213	42627	21527
3214	42627	21527
6711	38329	24212
6718	31829	11811
6726	38160	24212
6732	38442	24212
6774	31953	15497
6776	38152	42637
6781	37904	42637
6910	38089	40669
6921	1470	58890
6929	38281	42637
6936	31735	15102
6938	38039	42637
6944	38063	39149

TOTALS: 525740 467356

2 METHODS AND APPROACH

2.2.1.5 Baseline Energy Consumption: ECO - 5 (Improve Lighting Efficiency)

The baseline energy consumption for this ECO was calculated using a LOTUS123 spreadsheet. This spreadsheet modeled the energy consumption of the existing lighting system by utilizing the following:

- 1. Existing fixture type (i.e. fluorescent, mercury vapor, etc.)
- 2. Lamp wattage
- 3. Ballast wattage
- 4. Hours of use

The above information was obtained during the field survey.

Table 2.2.1.5.1 lists the baseline consumption for each building surveyed. Table 2.2.1.5.2 lists the baseline consumption for the exterior locations surveyed.

TABLE 2.2.1.5.1

BUILDING BASELINE ENERGY CONSUMPTION ECO - 5: IMPROVE LIGHTING EFFICIENCY

BUILDING NUMBER	BASELINE ENGERGY CONSUMPTION (MBTU)
38	488.95
89	154.42
91	332.36
95	316.44
2699	72.77
2745	194.07
3202	322.85
3204	26.67
3206	16.32
3207	55.76
3209	16.78
3307	52.81
3308	26.14
3411	158.00
5207	1841.08
5212	56.78
5661	392.87
5702	90.34
5740	26.00
6087	742.42
6088	174.38

BUILDING NUMBER	BASELINE ENGERGY CONSUMPTION (MBTU)
6140	70.92
6254	200.57
6302	59.44
6304	59.55
6306	76.8
6308	90.51
6390	211.91
6708	57.29
6713	49.31
6714	43.64
6715	176.50
6717	32.40
6720	127.32
6723	52.08
6729	45.38
7510	327.11
7514	2.76
7541	307.26
7543	5.59
7562	4.61
7574	1.06

TOTAL MBTU: 7520.21

TABLE 2.2.1.5.2

EXTERIOR LIGHTING BASELINE ENERGY CONSUMPTION

AREA NUMBER	AREA NAME	BASELINE ENERGY CONSUMPTION (MBTU)
1	PIERCE VILLAGE	543
2	La POINTE	193
3	HAMMOND HEIGHTS	459
4	LEE VILLAGE	1014

TOTAL: 2209

2

2.3 ENERGY CONSERVATION OPPORTUNITIES

Systems Corp analyzed five distinct energy conservation opportunities (ECOs) at Fort Campbell, Kentucky. The analysis was performed utilizing energy models developed by Systems Corp and data collected during the field survey of the facilities at Fort Campbell. Each ECO was evaluated to determine the potential energy savings, dollar savings, implementation costs, simple payback, life cycle cost and savings to investement ratio (SIR). The five ECOs that were evaluated are as follows:

- ECO 1 Instantaneous hot water heaters
- ECO 2 Ground water coupled heat pumps
- ECO 3 Refrigerant heat reclaim
- ECO 4 Replace chillers with high efficiency chillers
- ECO 5 Improve lighting efficiency

Systems Corp's energy analysis models were used to determine the savings achieved for implementing each ECO in the facilities that were evaluated. The U.S Army Corp of Engineers M-CACES software was utilized to estimate the implementation cost of each ECO in each facility evaluated. The U.S Army Corp of Engineers Life Cycle Cost in Design, Version 1.0, Level 72, software was used to perform life cycle cost analyses and determine the SIR of each ECO for each facility evaluated.

2.3.1 ECO - 1: Instantaneous Water Heaters

This ECO evaluation consisted of selecting a replacement water heating system to evaluate for energy savings. The water demand characteristics of each building were considered. In all buildings studied it was determined that semi-instantaneous water heaters were the best replacement option. Replacement of the existing water heater with a new semi-instantaneous water heater was evaluated for each building. The potential energy savings was found to be quite small for each building that was evaluated. The implementation costs for each building evaluated did not represent a large investment, but when compared to the savings resulted in simple paybacks in excess of twenty years. Replacing the water heater systems did not yield an acceptable simple payback in any of the buildings evaluated.

2 METHODS AND APPROACH

The reasons for the retrofits yielding poor simple paybacks were the size of the water heating systems that were evaluated, and the hot water demand and consumption characteristics of the facilities studied. Systems Corp recommends for future studies that instantaneous and semi-instantaneous water heaters only be considered in facilities that would meet this criteria such as hospitals, dining halls, laundries, gymnasiums, and some barracks.

2.3.2 ECO - 2: Ground Water Coupled Heat Pumps

The ECO evaluation consisted of selecting a ground water heat pump and a system configuration to evaluate. A ground water coupled heat pump with a seasonal energy efficiency rating (SEER) of 14 was selected for evaluation. The system configuration consisted of a one for one replacement of heat pumps; and separate supply and return wells serving every two heat pumps. Bin weather data was utilized in a spreadsheet format to model the annual energy consumption of both the existing system and the proposed systems. The most significant cost for the groundwater coupled heat pump is the well systems. The project did not have an attractive simple payback when evaluated with a dedicated supply and return well for each heat pump.

2.3.3 ECO - 3: Heat Reclaim from Hot Refrigerant Gas

The ECO evaluation consisted of quantifying the available heat that was recoverable and determining the best use of the heat. The heat is recovered from the hot suction gases after they leave before the gases pass through the condensing units. The heat is recovered in a shell and tube heat exchanger. The system consists of four heat exchangers. Two of the heat exchangers add heat to a circulating loop that serves restrooms and the employee break area. The other two heat exchangers add heat to the circulating loop that serves the produce, meat and other food processing areas.

2.3.4 ECO - 4: Replace Absorption Chillers with High Efficiency Units

The ECO evaluation consisted of evaluating four different alternatives for replacing the existing single stage absorption chillers with high efficiency chillers. The alternatives that were evaluated included: single stage absorption, two stage absorption, electric centrifugal, and natural gas engine driven screw chillers. The natural gas engine driven screw chillers provided the quickest simple payback and the highest savings to investment ratio.

2.3.5 ECO - 5: Improve Lighting Efficiency

The ECO evaluation consisted of determining appropriate lighting replacements to improve lighting system efficiency while achieving recommended illumination levels. The ECO includes comprehensive lighting replacements.

TABLE 2.3.5.1

LIGHTING SYSTEM REPLACEMENTS ECO 5

EXISTING LIGHTING

REPLACEMENT LIGHTING

T-12 Fluorescent Fixture	T-8 Fluorescent Fixture with reflector
T-12 Lamp	T-8 Lamp
Magnetic Ballast	Electronic Ballast

Incandescent Fixture	Compact Fluorescent Fixture
Incandescent Lamp	Compact Fluorescent Lamp and Ballast
Incandescent Exit Sign	LED (Light Emitting Diode) Exit Sign

Mercury Vapor Fixture	High Pressure Sodium Fixture
Mercury Vapor Ballast	Electronic Ballast
Mercury Vapor Lamp	High Pressure Sodium Lamp

The lighting replacements are for administrative, warehouse, maintenance, and retail facilities and roadway lighting.

3 PROGRAMMING DOCUMENT - ECIP PROJECT 1

SECTION 3

INTRODUCTION 3-1
PROGRAMMING DOCUMENT 3-2
ECO-4 PROJECT SUMMARY
PROJECT LCC ANALYSIS
BUILDING 3213 3-29
BUILDING 3214
BUILDING 6711
BUILDING 6718
BUILDING 6726
BUILDING 6732
BUILDING 6910
BUILDING 6921A 3-14
BUILDING 6929
BUILDING 6936
BUILDING 6938
BUILDING 6944
COOLING TOWERS COST ESTIMATE
CATALOG CUT SHEETS

The ECO evaluation consisted of evaluating four different alternatives for replacing the existing single stage absorption chillers with high efficiency chillers. The alternatives that were evaluated included: single stage absorption, two stage absorption, electric centrifugal, and natural gas engine driven screw chillers. The natural gas engine driven screw chillers provided the quickest simple payback and the highest savings to investment ratio.

This section contains the programming documentation for ECIP Project 1, replacement of absorption chillers with natural gas engine driven chillers. Included are the project development brochures, 1391 forms, life cycle cost analysis, cost estimates for each building, and energy calculations for each building. Catalog cut sheets are included as an appendix to the document (located at the end of this section) to represent the replacement products.

The life cycle cost analysis sections 3A and 3B refer to non-energy savings or costs present. For this project, Section 3A, Annual Recurring, reflects the additional maintenance costs associated with the use of natural gas engines. Section 3A, Non-Recurring Savings/Costs, refers to the eventual replacement of the existing chillers. Since the existing chillers are at the end of their economic life, it was assumed that they would be replaced with a similar system, another single stage absorption unit.

The project results presented in this section differ from the results presented in the interim report. Buildings 6774, 6776, and 6781 were removed from the project because they are scheduled for demolition within five years.

facility

Chiller Replacements

Fort Campbell, Kentucky

project coordinator for using service

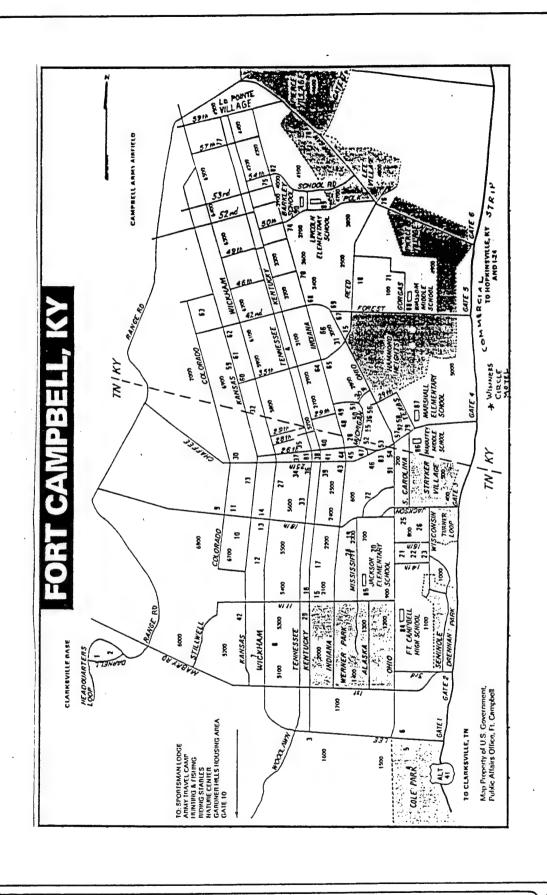
Arlin Wright

functional requirements summary, PDB-1

OBJECTIVE:

The objective of this project is to replace existing single stage absorbtion chillers with higher efficiency natural gas engine chillers. The replacement of the existing chillers will reduce energy consumption and life cycle operating costs for the subject facilities in accordance with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759.

functional requirements summary, PDB-1



facilities requirements sketch, PDB- ½

APPENDIX C DOCUMENTATION CHECKLIST

A. SPECIAL CONSIDERATIONS

	ITEM	Required Not Requ	To Be Determin	Commen	Documer
A-1	Cost estimates for each primary and supporting facility	R	D		1
A-2	Telecommunications system coordination with USACC and authorization for exceptions	NR			
A-3	Coordination with state and local governmental requirements (blind vendors, medical facilities, construction and operating permits, clearinghouse ecoordination, etc.)	R	A		
A-4	Assignment of airspace	NR			
A-5	Economic analysis of alternatives	R	D		
A-6	Approval for new starts	NR			
A-7	International balance of payments (IBOP) coordination with U.S. European command and NATO—overseas cost estimates and comparables (include rate of exchange used in estimates)	_NR			
8-A	Impact on historic places—on site survey by authorized archeologist and coordination with state historic preservation officer and advisory council on historic preservation	_NR			<u></u>
A-9	Exceptions to established criteria	_NR.			
A-10	Coordination with various staff agencies (Provost Marshall-physical security, etc.)	R_			
A-11	Identification of related or support projects (so projects can be coordinated)	R	<u> </u>		
A-12	Required completion date	R_	.		
	Other Special Considerations (List and number items) 1. See Appendix A				

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TO BE DETERMINED — Information needed but not currently evallable. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant Information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFA

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and explain)

documentation checklist

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C-5

B. SITE DEVELOPMENT

		Required Not Requ	To Be Determir	Commen	Documer Attached
	ITEM	œ ž	D o	کۆ	δ¥
B-1	Consultation with the District Office to determine and evaluate flood plain hazards				,
		NR			
B-2	Preparation, submission, and/or approval of new		·		
(A)	General Site Plan	NR_			
(B)	Annotated General Site Plan	NR_			
(c)	Sketch Site Plan	NR			
(D)	Facilities Requirements Sketch	R	_		
B-3	Preparation of	NR			
(A)	Site Survey		-		
(B)	Subsoil information	NR			
B-4	Approval by Department of Defense Explosive Safety Board (DDESB) for Safety Site Plan	NR			
	Other Site Development Considerations (List and number items)				
	1. See Project Development Brochure, PDB-1/2				
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- A DFAE
- B Using Service
- C Construction Service
- D Designer
- E Other (Check Comments Attached and explain)

documentation checklist

5-/

C. ARCHITECTURAL & STRUCTURAL

Peconciliation with troop housing programs and requirements Evaluation of existing facilities (including degree of utilization) Approval for removal and relocation of existing useable facilities Evaluation of off-post community facilities Storage and maintenance facilities (including nuclear weapons) Coordination hospitals, medical and dental facilities with Surgeon General	NR NR Not Red	To Be Determ	Comme	Docum Attach
Evaluation of existing facilities (including degree of utilization) Approval for removal and relocation of existing useable facilities Evaluation of off-post community facilities Storage and maintenance facilities (including nuclear weapons)	R NR NR	ם		1
Evaluation of existing facilities (including degree of utilization) Approval for removal and relocation of existing useable facilities Evaluation of off-post community facilities Storage and maintenance facilities (including nuclear weapons)	NR NR	<u> </u>		1
Approval for removal and relocation of existing useable facilities Evaluation of off-post community facilities Storage and maintenance facilities (including nuclear weapons)	NR			
Evaluation of off-post community facilities Storage and maintenance facilities (including nuclear weapons)			1	
Storage and maintenance facilities (including nuclear weapons)	NR_			
Coordination hospitals, medical and dental facilities with Surgeon General				
	NR_			
	NR			
	NR_			
	NR			
Evaluation of laboratory, research and development, and technical maintenance facilities	_NR_			
	NR			
Review food service facilities by USATSA	NR_			
Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities	NR			
Coordination postal facilities with U.S. Postal Service Regional Director	NR_			
	NR			
Tenant facilities coordination with installation where sited	NR_			
Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also Item B-4)	NR			
Analysis of deficiencies	R	D		
Consideration of alternatives	R	D		1_2_
Determination whether occupants will Include physically handicapped or disabled persons	NR			
As-build drawings for alterations or additions	R			.
Availability of Standard Design or site adaptable designs	NR			
Other Architectural & Structural (List and number items)				
Detailed Project Justification Paragraph D3. 2. See Supplemental Data Detailed Project Justification Paragraph D4.				
	Coordination of aviation facilities with FAA Coordination air traffic control and navigational aids with USACC Fabulation of types and numbers of aircraft Evaluation of laboratory, research and development, and technical maintenance facilities Coordination chapels with Chief of Chaplains Review food service facilities by USATSA Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities Coordination postal facilities with U.S. Postal Service Regional Director Laundry and dry cleaning facilities coordination with ASD(I&L) Tenant facilities coordination with installation where sited Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also Item B-4) Analysis of deficiencies Consideration of alternatives Determination whether occupants will include physically handicapped or disabled persons Availability of Standard Design or site adaptable designs Other Architectural & Structural (List and number items) See Supplemental Data Detailed Project Justification Paragraph D3. See Supplemental Data Detailed Project Justification	Coordination of aviation facilities with FAA Coordination air traffic control and navigational aids with USACC Fabulation of types and numbers of aircraft Evaluation of laboratory, research and development, and technical maintenance facilities Coordination chapels with Chief of Chapiains Review food service facilities by USATSA Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities Coordination postal facilities with U.S. Postal Service Regional Director Laundry and dry cleaning facilities coordination with installation where sited Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also Item B-4) Analysis of deficiencies Consideration of alternatives Determination whether occupants will include physically handicapped or disabled persons Availability of Standard Design or site adaptable designs Other Architectural & Structural (List and number items) See Supplemental Data Detailed Project Justification Paragraph D3. See Supplemental Data Detailed Project Justification	Coordination of aviation facilities with FAA Coordination air traffic control and navigational aids with USACC Fabulation of types and numbers of aircraft Evaluation of laboratory, research and development, and technical maintenance facilities Coordination chapels with Chief of Chaplains Review food service facilities by USATSA Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities Coordination postal facilities with U.S. Postal Service Regional Director Laundry and dry cleaning facilities coordination with ASD(I&L) Tenant facilities coordination with installation where sited Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also Item B-4) Analysis of deficiencies Consideration of alternatives Determination whether occupants will include physically handicapped or disabled persons As-build drawings for alterations or additions Availability of Standard Design or site adaptable designs Other Architectural & Structural (List and number Items) See Supplemental Data Detailed Project Justification Paragraph D3. See Supplemental Data Detailed Project Justification	Coordination of aviation facilities with FAA Coordination air traffic control and navigational aids with USACC Fabulation of types and numbers of aircraft Evaluation of laboratory, research and development, and technical maintenance facilities Coordination chapels with Chief of Chaplains Review food service facilities by USATSA Automated data processing system or equipment approvals—cost analysis when ADP and/or communication centers not co-located with related facilities Coordination postal facilities with U.S. Postal Service Regional Director Laundry and dry cleaning facilities coordination with ASD(I&L) Tenant facilities coordination with installation where sited Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See also item B-4) Analysis of deficiencies Consideration of alternatives Determination whether occupants will include physically handicapped or disabled persons Ax-build drawings for alterations or additions Availability of Standard Design or site adaptable designs Other Architectural & Structural (List and number items) See Supplemental Data Detailed Project Justification Paragraph D3.

REQUIRED OR NOT REQUIRED — Not relevant or no information to cominunicate. Enter "R" if Item is relevant and is required for this project. Enter "NR" if Item is irrelevant and is not required for this project.

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*BY WHOM (Check and Insert appropriate letter)

A - DFA

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and explain)

documentation checklist

D. MECHANICAL, ELECTRICAL, & UTILITY SYSTEMS

\subseteq		Require Not Rec	To Be Determ	Comme	Docum
	ITEM			S ¥	۵¥
D-1	Fuel considerations and cost comparison analysis	R	D		
D-2	Energy requirements appraisal (ERA)	R	<u>D</u> –		<u>'</u> _
D-3	Conformance with DOD Energy Reduction requirements	R	D		
D-4	Evaluation of existing and/or proposed utility systems	- `			
	Other Mechanical and Utility Systems (List and number items)				
	1. See Special Requirements, Paragraph 3 (SRP-3)				
	·				

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- A DFA
- B Using Service
- C Construction Service
- D Designer
- E Other (Check Comments Attached and explain)

documentation checklist

E. ENVIRONMENTAL CONSIDERATIONS

\equiv	ITEM	Require Not Rec	To Be Determi	Comme	Docum
E-1	Environmental impact assessment	R_	D		1
E-2	EIA conclusions require Environmental Impact Statement	_NR_			
E-3	Determination of health, environmental or related hazards. Assistance to determine existence of any health, environmental or related hazard may be requested from Aberdeen Proving Ground, MD 21010, the Office of the Surgeon General, Attn: DASG-HCH (Army Environmental Hygiene Agency)	NR			
E-4	Air/water pollution permit, coordination with agencies and compliance with standards at Federal, state and local level	NR			
E-5	Corrective measures associated with Environmental Impact Statements or assessment—list separately and evaluate.	NR			
	Other environmental considerations (list and number items)				
	1. See Supplemental Data Detailed Project Justification Paragraph D9.				

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A - DFAE

B - Using Service

C - Construction Service

D - Designer

E — Other (Check Comments Attached and explain)

documentation checklist

APPENDIX D TECHNICAL DATA CHECKLIST

A. SPECIAL CONSIDERATIONS

		2 6	اَعَا	5 2	£ \$
	ÌTEM	Required Not Requ	To Be Determin	Commen	Documer
A-1	Factors of risk, restriction or unusual circumstance expected to increase costs beyond applicable area averages	NR			
A-2	Construction phasing requirements	R_	D		
A-3	Functional support equipment (mechanical, electrical, structural, and security) to be built in	NR_			
A-4	Equipment in place and justification	NR			
A-5	Other equipment and furniture (O&MA, OPA) and costs	NR	<u> </u>		
A-8	Special studies and tests (hazards analyses, compatibility testing, new technology testing, etc.)	NR_			
A-7	Type of construction (permanent, temporary, semi-permanent)	_NR_	.		
A-8	Government furnished equipment (quantities, procurement time, availability and special handling and storage requirements). Funds used for procurement.	NR			
	Other special considerations (list and number items)				

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project.

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*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E — Other (Check Comments Attached and explain)

technical data checklist

B. SITE DEVELOPMENT

<u> </u>	S. SITE DEVELOTMENT	200	E S	ž P	£ 2
	TITEM	Required o	To Be Determine	Comment	Document Attached
6-1 (A)	Construction restrictions or guidelines pertaining to site access and preferred construction routes	R	. A		
(B)	Airfield clearance, explosive storage, working hours, safety, etc.	NR .			
(2)	Facilities and/or functions or adjoining areas (structures, materials, impact)	R	Α		
B-2	Real estate actions (acquisition, disposal, lease, right-of-way)	NR	·		
B-3	Demolition/relocation required (data)				
(A)	Special considerations due to explosives/radioactivity/ chemical contamination/asbestos emissions/toxic gases	R	Α	1	
(B)	Restrictions on disposal of demolished/relocated material including hazardous waste	NR			
B-4	Pavement types and requirements (including traffic surveys and MTMC coordination)	NR			
B-5	Landscape considerations Protection of existing vegetation	R	A		
(B)	Stockpile topsoil	NR			
	Other Site Development (List and number items) 1. There is a possibility that the existing pipe or chiller insulation may contain asbestos.				
1					

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" If item is relevant and is required for this project.

Enter "NR" If item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available.

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*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D — Designer

E — Other (Check Comments Attached and explain)

technical data checklist

C. ARCHITECTURAL & STRUCTURAL

	ITEM	Require Not Re	To Be Determ	Comme	Docum Attach
C-1	Vibration-producing equipment requiring isolation	R	٥		
C-2	Seismic zone and other design load criteria (typhoon, hurricane, earthquake loads, high or low loss potential)	NR			
C-3	Protective shelter evaluation and resistant design criteria (conventional/nuclear blast and radiation, chemical/biological)	NR			
C-4	Unusual foundation requirements (pier, pile, caisson, deep foundations, mat, special treatment, permafrost areas, soll bearing)	NR			
C-5	Designation and strength of units to be accommodated	NR			
C-8	Requirements and data for special design projects	NR_			
C-7	Unusual floor and roof loads (safes, equipment)	N.R.			
C-8	Security features (arms rooms, vaults, interior secure areas)	NR			

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" If item is relevant and is required for this project.

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*BY WHOM (Check and insert appropriate letter)

A - DEA

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and

expisin)

technical data checklist

D. MECHANICAL, ELECTRICAL, & UTILITY SYSTEMS

\equiv		Require Not Re	To Be Determ	Comme	Docum Attach
	ITEM	πž	P Q	ŏ₹	۵∢
D-1	Special mechanical requirements or considerations (elevator, crane, hoist, etc.)	NR			
D-2	Special peak usage periods and peak leveling techniques	NR			
D-3	Maintenance considerations (accessibility of equipment, compatibility with existing equipment)	R	D		
D-4	Plumbing—availability, general system type and characteristics (proposed and/or existing, incl. compressed air and gas)	R	D		
D-5	Heating—availability, general system type and characteristics (proposed and/or existing)	NR			
D-6	Ventilating, air condition/refrigeration—availability, general system type and characteristics (proposed and/or existing)	R	D		
D-7	Electrical—availability, general system type and characteristics incl. airfield lighting, communication, etc. (proposed and/or existing)	NR			
D-8	Water supply/waste treatment—availability, general system type and characteristics (proposed and/or existing)	NR			
D-9	Energy requirements/fuel conversion (sources, availability, loads, types of fuel, etc.)	R	D		
D-10	Solar energy evaluation	NR			

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if Item is relevant and is required for this project.

Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently evailable. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and explain)

technical data checklist

E. ENVIRONMENTAL CONSIDERATIONS ITEM Waste water treatment, air quality, and solid waste disposal criteria NRE-1 Other Environmental Considerations (List and number items)

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E — Other (Check Comments Attached and explain)

technical data checklist

To Be • Determined F. FIRE PROTECTION **ITEM** NR F-1 Special fire protection systems or features (detection and suppression equipment, hazards, etc.) Other Fire Protection Considerations (List and number Items)

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

#BY WHOM (Check and insert appropriate letter)

- A DFAE
- B Using Service
- C Construction Service
- D Designer
- E Other (Check Comments Attached and explain)

technical data checklist

3-1/

1. COMPONENT ARMY	FY 1	9 94 MILITARY CO	NSTRU	CTI	2. DATE 06 October 93				
3. INSTALLATION AND LOC Fort Campbell		cky		4. PR	OJECT TITL		REPLACEM	IENT	
5. PROGRAM ELEMENT		6. CATEGORY CODE	7. PROJE		DMBER P #1		8. PROJECT	cost (\$000) \$3900	
		9.	COST EST	MATE	s				
		ITEM			U/M	Q	JANTITY	UNIT COST	COST (\$000)
Primary Facility Natural Gas Engin	e Driver	n Screw Chillers, Piping, D	irect Digi	tal					
Controls and Wiri	ng				Lot		1	3,350,000	3,350
Subtotal									3,350
Contingency (10%)								350
Total Contract Cos	st								3,700
Supervision, Inspe	ection ar	nd Overhead (5.0%)							200
Total Request									3,900

10. DESCRIPTION OF PROPOSED CONSTRUCTION

The existing chillers are single stage absorption. The existing chillers are inefficient and not cost effective. The proposed project will replace the existing chillers with natural gas engine driven chillers. The implementation of this project will save 301,490 Mbtu/Yr of natural gas energy. The first year savings is \$1,336,609 and the Savings to Investment Ratio (SIR) is 6.5.

11. REQUIREMENT

Project: The proposed project replaces twelve (12) existing single stage absorption chiller with twelve new natural gas engine driven chillers.

Requirement: The project is required to reduce the energy consumption of chillers and to comply with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759. The proposed project will reduce annual energy consumption by 301,490 Mbtu/YR and annual energy cost by \$1, 336,609.

Current Situation: The existing chiller plants in building numbers 3213, 3214, 6711, 6718, 6726, 6732, 6910, 6921A, 6929, 6936, 6938, 6944, are single stage absorption chillers. The chillers are an inefficient cooling source. The chiller were installed over a four year period starting in FY74.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

1. COMPONENT ARMY	FY 19 94 MILITARY CONS	TRUCTION PROJECT DATA 2. DATE 06.0	October 93
3. INSTALLATION AND Fort Campbe			
4. PROJECT TITLE CHILLER REP	LACEMENT	5. PROJECT NUMBER ECIP :	#1

Impact if not provided: If the proposed project is not funded, a reduction of 301,490 MBtu/YR cannot be achieved, and excessive amounts of energy will continue to be used. There will be no contribution to energy reduction goals established for United States Army facilities by Army Headquarters.

Colonel, USA Commanding

ESTIMATED CONSTRUCTION START:

September 1994

INDEX:

ESTIMATED MIDPOINT OF CONSTRUCTION:

April 1995

INDEX:

ESTIMATED CONSTRUCTION COMPLETION:

November 1995

INDEX:

DETAILED JUSTIFICATIONS

D1. GENERAL

The proposed project encompasses the replacement of fifteen (15) single stage absorption chillers with natural gas engine driven chillers. The project will decrease the energy consumption of the cooling systems without reducing the level of cooling.

D2. ACCOMMODATIONS NOW IN USE:

The existing cooling systems are comprised of fifteen (15) single stage absorption chillers.

D3. ANALYSIS OF DEFICIENCY:

Currently, twelve (12) single state absorption chillers are used to cool a number of barracks. The chillers have low coefficients of performance (COP). The purpose of this project is to replace the existing chillers with new chillers that have a much higher coefficient of performance (COP) and are thus, more energy efficient. The current deficiency results in large amounts of energy usage to maintain adequate cooling for comfort.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

FOR OFFICIAL USE ONLY

1. COMPONENT ARMY	2. DATE 06 October 93	
3. INSTALLATION AND LO Fort Campbell, H		
4. PROJECT TITLE CHILLER REPL		DECT NUMBER ECIP #1

D4. CONSIDERATION OF ALTERNATIVES:

The only alternatives to proposed project are to install lower efficiency absorption chillers. The disadvantages of using lower efficiency absorption chillers is that less energy savings can be realized without significantly reducing the construction cost. If a less efficient chiller is selected, the project would have a lower SIR.

D5. CRITERIA FOR PROPOSED PROJECT:

The proposed project will conform with all applicable federal and United States Army Regulations.

D6. PROGRAM FOR RELATED EQUIPMENT:

No equipment funded from appropriations other than MCA are required.

D7. DISPOSAL OF PRESENT ASSETS:

Twelve (12) single state absorption chillers will be disposed.

D8. SURVIVAL FACILITIES:

The proposed project is not suitable for inclusion of protective shelters.

D9. SUMMARY OF ENVIRONMENTAL CONSEQUENCES:

The proposed project has been analyzed and will not adversely impact the environment. Energy savings resulting from the project will conserve natural resources.

D10. EVALUATION OF FLOOD HAZARDS AND ENCROACHMENT ON WETLANDS:

It has been determined that these facilities are not located in a flood plain and they do not encroach on wetlands.

D11. ECONOMIC JUSTIFICATION:

The proposed project qualifies under ECIP Guidelines in AR-415-15. SIR for the project if 6.5 with a simple payback of 3.08 years.

See Economic Analysis, SRP-1.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

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1. COMPONENT ARMY	FY 19 94 MILITARY CONSTRUC	CTION PROJECT DATA 2. DATE 06 Oct	otober 93
3. INSTALLATION AND Fort Campbel			
4. PROJECT TITLE CHILLER REPLAC	MENTS	5. PROJECT NUMBER ECIP #1	

D12. UTILITY AND COMMUNICATION SUPPORT:

- A. No related utility support projects are programmed. Adequate utilities are available to support the project.
- B. No telecommunication support is required.

D13. PROTECTION OF HISTORIC PLACES AND ARCHEOLOGICAL SITES:

The project involves the replacement of chillers located in basements. Review procedures have been implemented for this project in accordance with 36 CFT 800. The review has established that there will be no effect.

D14. PROJECT DEVELOPMENT BROCHURE (PART 1):

A Project Development Brochure was prepared on 06 October 93 and is attached as a part of the programming documentation.

D15. ENERGY REQUIREMENTS:

The proposed project will reduce present energy consumption by 319,804 MBtu/Yr at the cost savings of \$1,279,216 per year. See Energy Requirements Appraisal (ERA) in Special Requirements, Paragraph 3 (SRP-3).

D16. PROVISION FOR THE HANDICAPPED:

No provisions for the handicapped will be made since the scope of the project is in no way applicable to designing for the handicapped.

D17. REAL PROPERTY MAINTENANCE ACTIVITY (RPMA) ANALYSIS:

A. Physical impact: There will be twelve (12) chillers removed and replaced by twelve (12) new chillers. No new structures will be added.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
UNTIL EXHAUSTED

1. COMPONENT ARMY FY 19 94 MILITARY CONSTRUCTION PROJECT DATA 2. DATE 06 Octobe					
3. INSTALLATION AND LOCATION Fort Campbell, Kentucky					
4. PROJECT TITLE CHILLER RE	UMBER ECIP #1				

B. Operations and Maintenance (O&M) impact:

		O&M
YEAR		NET CHANGE (\$000)
1994		0.0
(BOD)		0.0
1995		0.0
1996	•	0.0

C. Backlog of Maintenance and Repair (BMAR) impact:

There will be no net change in the number of chillers or in chiller life expectancy. There will be no effect on BMAR.

D18. COMMERCIAL ACTIVITIES:

The proposed project is not a "New Start Expansion" as defined by DA Circular 235-1. The project has been reviewed in light of the requirements of commercial and industrial facilities. It has been determined that whereas the project does not affect commercial facilities, the requirements of DA Circular 235-1 does not apply.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

2. DATE 1. COMPONENT 06 October 93 FY 19 94 MILITARY CONSTRUCTION PROJECT DATA **ARMY** 3. INSTALLATION AND LOCATION Fort Campbell, Kentucky 5. PROJECT NUMBER 4. PROJECT TITLE CHILLER REPLACEMENTS ECIP #1 SPECIAL REQUIREMENTS PARAGRAPH 1 (SRP-1): Life Cycle Cost Analysis Project Title: CHILLER REPLACEMENTS Fiscal Year: 1994 Analysis Date 10/06/93 Economic Life: Twenty (20) Years 1. INVESTMENT A. CONSTRUCTION COST \$3,724,451 B. SIOH \$204,845 \$186,226 C. DESIGN COST D. ENERGY CREDIT CALC -0--0-E. SALVAGE VALUE F. TOTAL INVESTMENT \$4,115,522 2. ENERGY SAVINGS ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS SAVINGS MBtu/YR(2) DISCOUNT FACTOR(4) COST **ANNUAL \$** DISCOUNTED **FUEL** SAVINGS(3) \$Mbtu (1) SAVINGS(5) A. ELECT B. DIST C. RESID D. NG 4.00 301,490 1,205,960 20.60 24,842,780 E. COAL 301,490 1,205,960 24,842,780 F. TOTAL 3. NON-ENERGY SAVINGS A. ANNUAL RECURRING (1)DISCOUNT FACTOR 13.59 (2) DISCOUNTED SAVINGS **B. NON-RECURRING SAVINGS** ITEM SAVINGS(+) YEAR OF COST(-)(1) OCCURRENCE(2) a. Replace chillers 2,612,939 8 0.73 1,907,446 b. C. d. Total 2,612,939 1,907,446 C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST(-) 1,907,446

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
UNTIL EXHAUSTED

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2. DATE 1. COMPONENT 06 October 93 FY 19 94 MILITARY CONSTRUCTION PROJECT DATA **ARMY** 3. INSTALLATION AND LOCATION Fort Campbell, Kentucky 5. PROJECT NUMBER 4. PROJECT TITLE ECIP #1 CHILLER REPLACEMENTS SPECIAL REQUIREMENTS PARAGRAPH 1 (SRP-1) (continued) D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% NON ENERGY CALC \$1,336,607 4. FIRST YEAR DOLLAR SAVINGS \$26,750,220 5. TOTAL NET DISCOUNTED SAVINGS 6.50 6. DISCOUNTED SAVINGS RATIO

1. COMPONENT ARMY	FY 19 94 MILITARY CONSTRUCTION PROJE		2. DATE 06 October 93
3. INSTALLATION AND Fort Campbell, I			
4. PROJECT TITLE CHILLER REP		5. PROJECT NU ECIP #1	MBER

SPECIAL REQUIREMENTS PARAGRAPH 3 (SRP-3)

Energy Requirements Appraisal (ERA)

- 1. Project Description: Replace existing single stage absorption chillers with more efficient natural gas engine driven chillers, without reducing the cooling capacities.
- 2. Estimated Energy Consumption: The barracks are currently cooled by single stage absorption chillers. The existing cooling system consumes 366,585 Mbtu/YR of single stage absorption chillers energy. Replacing the existing chillers with natural gas engine driven chillers will result in 301,490 Mbtu/YR of natural gas energy savings, an eighty-six percent (86%) reduction in current energy consumption.
- 3. Energy Sources: No new energy sources are required for the proposed project. The use of solar energy for this project is impractical.
- 4. Energy Use Impacts: The proposed project will substantially reduce the consumption of natural gas for cooling. The burden on the existing base distribution system will be lessened.
- 5. Energy Conservation: The proposed project will reduce annual energy consumption by 301,490 Mbtu/YR with annual energy cost savings of \$1,279,216. The project complies with Army Resources Management Plan (ERMP) and Executive Order 12759.
- 6. Energy Alternatives: The proposed project represents the greatest possible reduction in energy consumption eighty-six percent (86%), without reducing the current cooling levels. The current levels do not exceed the levels recommended by ASHRAE.
- 7. Energy Effects: The proposed project provides positive environmental effects. It reduces the current energy consumption by eighty-six percent (86%), effectively reducing the consumption of non-renewable fuel sources and the resulting polluting air emissions from steam generation. The degrading of environmental standards would not make more efficient energy sources available.
- 8. Basis of Approval: Total energy requirements and alternative fuel sources have been considered and included in this appraisal or discarded as applicable.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
LINTIL EXHAUSTED

PAGE NO. 25 OF

	SIR	7.76 7.76 5.78 5.66 5.79 10.94 10.94 6.03 10.94 8.41	6.87
	SPB (YR)	2.58 3.42 3.42 3.42 1.93 1.84 2.39 2.39	2.92
	INVESTMENT COSTS	\$202,790 202,790 293,136 151,178 292,863 292,863 292,863 491,489 292,863 180,670 292,863 337,103	\$792,051 \$4,115,522
SURVEY KY RY SEMENT	1ST YEAR SAVINGS	\$78,660 78,660 85,654 43,226 85,654 152,026 212,864 158,910 54,942 158,910	\$1,336,609
FORT CAMPBELL, KENTUCKY ECO - 4 PROJECT SUMMARY SRPTION CHILLER REPLACEMENT	ENERGY SAVINGS (MBTU)	17,692 17,692 18,517 9,348 18,517 18,517 35,110 48,427 36,831 36,831 32,025	301,490
AMPBELL PROJECT	ECO ENERGY (MBTU)	3,835 3,835 5,695 2,463 5,695 5,695 10,463 3,119 5,806 7,124	65,095
ENERGY SAVINGS OPPORTUNITY SURVEY FORT CAMPBELL, KENTUCKY ECO - 4 PROJECT SUMMARY ABSORPTION CHILLER REPLACEMENT	BASELINE ENERGY (MBTU)	21,527 24,212 24,212 11,811 24,212 40,669 58,890 42,637 15,102 42,637 39,149	L PROJECT 366,585
ENEF	CHILLER SIZE (TONS)	210 210 320 320 320 320 570 570 380	COOLING TOWERS - TOTAL PROJECT 525,740 3,595 366,585
	BUILDING	42,627 42,647 38,329 31,869 38,160 38,442 38,089 1,470 38,281 31,735 38,039 38,063	COOLING TC 525,740
	BUILDING NUMBER	3213 3214 6711 6718 6726 6732 6921 6929 6936 6968	TOTALS

INSTALLATION & LOCATION: FT CAMPBELL REGION NOS. 4 CENSUS: 3 PROJECT NO. & TITLE: TOT-4-3-1 CHILLER - REPLACE ALL WITH NATURAL GAS FISCAL YEAR 1994 DISCRETE PORTION NAME: CHILLER ANALYSIS DATE: 10-06-93 ECONOMIC LIFE 20 YEARS PREPARED BY: KEITH DERRING 1. INVESTMENT 3724451. A. CONSTRUCTION COST \$ B. SIOH 186226. \$ C. DESIGN COST 204845. D. TOTAL COST (1A+1B+1C) \$ 4115522. E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0. F. PUBLIC UTILITY COMPANY REBATE 0. G. TOTAL INVESTMENT (1D - 1E - 1F) 4115522. 2. ENERGY SAVINGS (+) / COST (-) DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS OCT 1992 UNIT COST SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5) FUEL 0. 0. 14.65 A. ELECT \$ 6.18 0. 0. 0. \$ 17.70 \$ 0. B. DIST \$.00 0. 0. C. RESID \$.00 D. NAT G \$ 4.00 20.99 \$ 1205960. \$ 0. 20.60 16.32 \$ 24842780. 301490. .00 0. 0. E. COAL \$ \$ 0. 13.59 0. F. PPG S .00 0. 0. 0. 13.59 M. DEMAND SAVINGS 301490. \$ 1205960. \$ 24842780. N. TOTAL 3. NON ENERGY SAVINGS(+) / COST(-) A. ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 13.59 0. (2) DISCOUNTED SAVING/COST (3A X 3A1) B. NON RECURRING SAVINGS(+) / COSTS(-) SAVINGS(+) YR DISCNT COST(-) OC FACTR DISCOUNTED SAVINGS(+)/ ITEM (1) COST(-)(4)(2) (3) .73 1. REPLACE \$2612939. 8 1907446.

\$2612939.

LIFE CYCLE COST ANALYSIS SUMMARY

d. TOTAL

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

1907446.

STUDY: TOT4-31

LCCID 1.072

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: TOT4-31 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.072 REGION NOS. 4 CENSUS: 3 INSTALLATION & LOCATION: FT CAMPBELL CHILLER - REPLACE ALL WITH NATURAL GAS PROJECT NO. & TITLE: TOT-4-3-1 FISCAL YEAR 1994 DISCRETE PORTION NAME: CHILLER ANALYSIS DATE: 10-06-93 ECONOMIC LIFE 20 YEARS PREPARED BY: KEITH DERRING C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 1907446. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3B1d/(YRS ECONOMIC LIFE))\$ 1336607. 3.08 YEARS 5. SIMPLE PAYBACK PERIOD (1G/4) \$ 26750220. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) (SIR) = (5 / 1G) =6.50 7. SAVINGS TO INVESTMENT RATIO (IF < 1 PROJECT DOES NOT QUALIFY) 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 14.20 %

FORT (SAMPBEI ECO 4: RE	MPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	INGS OF LERWITHHIGH ST 1993	PORTUNIT EFFICIENCY UNIT	Y SURVEY
LOCATION: BLC TYPE/SIZE: Carr MODEL/SERIAL N PUMPS: Two 10 PAGE 1 OF 5	LOCATION: BLDG 3213 TYPE/SIZE: Carrier Single Stage Aborption Chiller/210 Tons MODEL/SERIAL NUMBER: 16.B021-604/780408152 PUMPS: Two 10 HP Chilled Water, Two 10 HP Condenser Water PAGE 1 OF 5	1/210 Tons 1152 ndenser Water			
ABSORPTION C	ABSORPTION CHILLER ENERGY BASELINE				222
	COOLING	FULL	FULL	CHILLER	ENERGY
BIN	8	BTU/HR	LOAD	COP	(MBTU/YR)
95/99		2520000	180	0.405	222
90/94	90/94	2520000	2 8	0.405	967 2816
65/89	65/69 80/84 511	2520000	88	0.405	3634
75/79	664	2520000	29	0.405	3954
70/74	70/74	252000	52	0.405	4003
65/69 60/64	65/69 69/3 60/64 47 1	2520000 2520000	\$ X	0.405	1465
55/59	299	2520000	8	0.405	797
	191	2520000	25	0.405	438
45/49	111	2520000 2520000	10 0	0.405	86
	ABSORPTION CHILLER BASELINE ENERGY CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY TOTAL BASELINE ENERGY	ENERGY R PUMP BASELINE ENER	łĠY		21082 445 21527
ABSO CHILL TOTAL	ABSORPTION CHILLER BASELINE ENERGY COST CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY COST TOTAL BASELINE ENERGY COST	ENERGY COST R PUMP BASELINE ENER	AGY COST		84327 5224 89551
ENERGY C	ENERGY CONSUMPTION	21527 MBTU	·	COST	\$89,551

FY SURVEY		ANNUAL ENERGY CONBUMPTION	(MBTU/YR) 3 32 140 146	557 641 580 455 2566 151 151 24	3445 389 3834	13780 4571 18351	\$18,351 S \$71,200
OPPORTUNIT		UMPTION	COP 2 2 2 2 1.92	1.85 1.75 1.67 1.65 1.56 1.5 1.45 1.39	λ.	Ycost	COST NET DOLLAR SAVINGS
MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993		EN CHILLER ENERGY CONS FULL % LOAD FULL	2520000 100 2520000 100 2520000 100 2520000 100	2520000 67 2520000 67 2520000 67 2520000 43 2520000 35 2520000 25 2520000 10 2520000 10	ENGINE DRIVEN CHILLER ENERGY ENSER WATER PUMP ENERGY 1L'GÀS ENGINE DRIVEN CHILLER SYSTEM ENERGY	ENGINE DRIVEN CHILLER ENERGY COST ENSER WATER PUMP ENERGY COST IL GAB ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	3834 MBTU 17692 MBTU
FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	LOCATION: BLDG 3213 TYPE/SIZE: New Natural Gas Engine Driven Chiller/210 Tons PUMPS: Two 10 HP Chilled Water, Two 7.5 HP Condenser Water PAGE 4 OF 5	ENGINE DRIV	4ENCES B 2 2 11 352	511 684 866 893 471 299 197 111	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CHILLED AND CONDENSER WATER PUMP ENERGY TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER S	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST CHILLED AND CONDENSER WATER PUMP ENERGY COST TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYSTEK	ENERGY CONSUMPTION NET ENERGY SAVINGS
FOR	LOCATION: BLDG 3213 TYPE/SIZE: New Natural Gas En PUMPS: Two 10 HP Chilled Wat PAGE 4 OF 5	OPTION C: NEV	100/104 95/99 90/94 85/89	80/84 75/79 70/74 65/69 60/64 55/59 50/54 45/49	NEW NATURAL GAS CHILLED AND COND TOTAL NEW NATURA	NEW P CHILL TOTAL	ENERGY CONSUMPTION NET ENERGY SAVIN

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

M-CACES EDITION COMPOSER Plus Copyright (C) 1985, 1988 by Building Systems Design, Inc. Release 4.20

> PROJECT ID: 3213-3 3-31

CREW ID: ORL290

CURRENCY in DOLLARS

BLE OF CONTENTS

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

CONTENTS PAGE 1

SUMMARY REPORTS	SUMMARY PAGE
PROJECT NOTES. BID ITEM AND FACILITY SUMMARY. PROJECT CWE SUMMARY. CONTRACTOR DIRECT SUMMARY. CONTRACTOR INDIRECT SUMMARY. CSI DIVISION SUMMARY. SYSTEMS SUMMARY. EQUIPMENT SUMMARY.	
LABOR SUMMARY	9
DETAILED ESTIMATE	DETAIL PAGE
1. BUILDING TO THE 5 FOOT LINE AA. ELECTRICAL	1

* * * END TABLE OF CONTENTS * * *

PETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 10:50:20

DETAIL PAGE

BASE BIT

							Dane Dir
DIVISION 16 ELECTRICAL	QUANTITY UOH CREW	HANER	LABOR	EQUIPMENT	KATERIAL	SALESTY	DIRECT \$
16050 BASIC HATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS	POSED CONDITION. UNED TO BE FIELD BENT						
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER	•					
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF		591.69 178	2.65 1	825.93 248	41.30 12	1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA		1650.50 1,651	0.00	12000.00		14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

ETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3
1. BUILDING TO THE 5 POOT LINE / BA. MECHANICAL

TIME 10:50:20

DETAIL PAGE 2

BASE BID

QUANTITY UOH CREW	KANHR	Labor	EQUIPHENT	MATERIAL	SALESTX	DIRECT
ings						
*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19 19	8.7 87
*** UNIT COSTS: *** 100.00 LF MSPFE	0.22 22	5.92 592	0.23 23	5.42 542	0.27 27	
*** UNIT COSTS: *** 16.00 EA MSPFE	3.50 56	96.47 1,544	3.68 59	11.11 178	0.56 9	111.8
ſ .						
*** UNIT COSTS: *** 4.00 EA MSPFE	5.26 21	144.97 580	5.53 22	20.60 82	1.03 4	172.1 68
*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.8 2,33
*** UNIT COSTS: *** 100.00 LF AASBC	80.0	2.51 251	0.03	1.91 191	0.10 10	4.5
HILLERS						
ING *** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	102900.00	5145 5,145	111993.7
IT *** UNIT COSTS: *** 2.00 EA MSPFA	10.00	299.30 599	4.03	3000.00 6,000	150.00 300	3453.3 6,90
	284	7,905	403	112,306	5,615	126,22
	*** UNIT COSTS: *** 100.00 LF MSPFE *** UNIT COSTS: *** 100.00 LF MSPFE *** UNIT COSTS: *** 16.00 EA MSPFE *** UNIT COSTS: *** 4.00 EA MSPFE *** UNIT COSTS: *** 2.00 EA MSPFA TH FIRE RETARDANT F INCLUDE FITTINGS - FOR EACH F *** UNIT COSTS: *** 100.00 LF AASBC HILLERS ING *** UNIT COSTS: *** 1.00 EA MSPFO	*** UNIT COSTS: *** 0.17 100.00 LF MSPFE 17 *** UNIT COSTS: *** 0.22 100.00 LF MSPFE 22 *** UNIT COSTS: *** 3.50 16.00 EA MSPFE 56 *** UNIT COSTS: *** 5.26 4.00 EA MSPFE 21 *** UNIT COSTS: *** 3.33 2.00 EA MSPFA 7 TH FIRE RETARDANT T INCLUDE FITTINGS - FOR FITTING 5 4 LF (1.2M) FOR EACH FLANGED 5 *** UNIT COSTS: *** 0.08 100.00 LF AASBC 8 HILLERS ING *** UNIT COSTS: *** 134 1.00 EA MSPFO 134	*** UNIT COSTS: *** 0.17			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3213-3

TAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 10:50:20

DETAIL PAGE 3

BASE BID

DIVISION 15 NECHANICAL	QUANTITY UON CREW	KANER	LABOR	EQUIPMENT	naterial	SALESTX	DIRECT \$

TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		354	10,140	405	124,724	6,236	141,506
TOTAL BASE BID		354	10,140	405	124,724	6,236	141,506
		0	0	0	0	0	0
TOTAL ADDITIVE							
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		354	10,140	405	124,724	6,236	141,506

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3213-3

ROJECT NOTES

CREW ID: ORL290

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

SUNNARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

CURRENCY in DOLLARS PROJECT ID: 3213-3

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

ID ITEM AND FACILITY SUMMARY

SUMMARY PAGE

TIME 10:50:20

BID	ITEM 1 F	BUILDING TO THE 5 FO	OT LINE							BASE BII
ID	FACILITY		COST TO PRI	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COS!
λλ	ELECTRICAL	1.00	EA 15,277	10.0% 1,528	0.0	7.5% 1,260	2.5 \ 452	0.0	18,516	18516.2
ВА	HECHANICAL	1.00	EA 126,229	10.0 1 12,623	. 0.01	7.5 % 10,414	2.5 \ 3,732	0.0	152,998	152997.5:
BID	ITEN TOTAL	1.00	EA 141,506	14,151	0	11,674	4,183	0	171,514	171513.74
TOT	AL BASE BID		141,506	14,151	0	11,674	4,183	0	171,514	
TOT	AL ADDITIVE		0	0	0	0	0	0	0	
TOT	AL INCL ADD		141,506	14,151	0	11,674	4,183	0	171,514	

CURRENCY in DOLLARS

PROJECT ID: 3213-3 3-37

POJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

SUMMARY PAGE 3

 ID BID ITEM	NOU YTITHAUQ	base bid	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	171,514		171,514	171513.70
TOTAL CURRENT CONTRACT COST		171,514	0	171,514	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST		171,514	0	171,514	
Government-Furnished Property		0 .		0	
SUBTOTAL	•	171,514	0	171,514	
Contingencies	7.0%	12,006	0	12,006	
SUBTOTAL	•	183,520	0	183,520	
SIOH (S&A)	5.5	10,094	0	10,094	
CURRENT WORKING ESTIMATE	•	193,613	0	193,613	
CURRENT WORKING ESTIMATE		193,613	U	193,613	
Estimated Construction Time	365 Days	•			

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: 3213-3

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

SUMMARY PAGE

TIME 10:50:20

ONTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PN	QUANTITY	DOH	KANHRS	LABOR	EQUIPHENT		** TOTAL D AHOUNT		* SUBCON W/OH&P	±	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	354	10,140	405	130,960	141,506	100.0		0	141,506
	TOTAL DIRECT				354	10,140	405	130,960	141,506	100.0			

PROJECT ID: 3213-3

CURRENCY in DOLLARS

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

SUNMARY PAGE

TIME 10:50:20

ONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PK	SUBTOTAL	OVERHEA AMOUNT			PROFIT AMOUNT						RACT ****** UNIT COST
λλ	GENERAL/PRIME		141,506	 14,151	10.0	0.0	 11,674	7.5	2.5	0.0	171,51	4 100.0	171513.74
	TOTAL OVERHEAD & PROFIT			14,151	10.0%		11,674	7.5					

SI DIVISION SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

SUMMARY PAGE

 ID CSI DIVISION	HANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT	
 15 MECHANICAL 16 ELECTRICAL	284 69	7,905 2,235	403 3	112,306 12,418	5,615 621	126,229 15,277	
TOTAL DIRECT	354	10,140	405	124,724	6,236	141,506	

YSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

SUMMARY PAGE

					1	**** TOTAL *	
 ID SYSTEM	HANHOURS	LABOR	EQUIPMENT	HATERIAL	SALES TAX	DIRECT	
O8 PLUMBING O9 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	123 161 69	3,426 4,479 2,235	124 278 3	1,376 110,930 12,418	69 5,547 621	4,995 121,234 15,277	
TOTAL DIRECT	354	10,140	405	124,724	6,236	141,506	

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:2

EQUIPHENT SUMMARY

SUNNARY PAGE

EQUIP	DESCRIPTION	LIFE	BOOK THE		ADJUSTD OWNRSHP	HRLY RATE		**** TOTA	COS!
ECR25 ENI20 EWE10	SHALL TOOLS					24.63 1.40 1.62	24.63 1.40 1.62	6 87 78	15: 12. 12
TOTAL	PROJECT EQUIPHENT HOURS							171	40:

LABOR SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3213 OPTION 3

TIME 10:50:20

SUMPLARY PAGE

CRAFT	DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	HRLY RATE	UPB RATE	**** TO	OTAL **** COST	
LASBW	ASBESTOS WORKER	20.45	0.01	24.0	5.91	0.00	31.27	24.86	8	251	
LELEC	ELECTRICIANS	20.50	0.0	24.0	7.49	0.00	32.91	25.79	69	2,235	
LLABR	LABORER/HELPER EQ OPER, NEDIUN	17.25 21.40	0.0	24.0%	3.07 6.20	0.00	24.46 32.74	18.52 21.87	32 6	783 210	
LSPFI	STEAM/PIPEFITTERS	20.95	0.0	24.0%	3.85	0.00	29.83	26.12	238	6,662	
TOTAL	PROJECT HANHOURS								354	10,140	

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290 CURRENCY in DOLLARS

PROJECT ID: 3213-3 3-44

FORT C	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY	LL ENERGY SAVINGS OPPORTUNITY EPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	SAVINGS OF ON CHILLER WITH HIGH	PORTUNI EFFICIENCY UNI	ry Survey
LOCATION: BLDG 3214 TYPE/SIZE: York Single Stage Aborption MODEL/SERIAL NUMBER: ESA2A4AEW PUMPS: Two 10 HP Chilled Water, Two 1 PAGE 1 OF 5	age Aborption ESA2A4A/EN 1 Water, Two 1	Chiller/210 Tons 1095547 IO HP Condenser Water			
ABSORPTION CHILLE	ABSORPTION CHILLER ENERGY BASELINE				Z
Ē	SEASON	FULL	FULL	CHILLER	ENERGY CONSUMPTION
4	OCCUPINE 2	252000	180	0.405	18
	25	2520000	100	0.405	222
85/89	352	252000	3 8	0.405	2816
80/84	511	2520000	- 80	0,405	3634
	664	2520000	29	0.405	3954
	999	2520000	52	0.405	4003
- 3	693	2520000	43	0.405	2649
	4/1	252000	કે લ	0.405	707
55/59	293 101	2520000	સ્ જ	0.405 7.005	18.1
45/49	111	252000	10	0.405	35
	69	2520000	0	0	0
ABSORPTIO CHILLED AN TOTAL BASE	ABSORPTION CHILLER BASELINE I CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY	ELINE ENERGY WATER PUMP BASELINE ENERGY	ERGY		21082 445 21527
ABSORPTION CHILLER BAS CHILLED AND CONDENSER TOTAL BASELINE ENERGY		ELINE ENERGY COST I WATER PUMP BASELINE ENERGY COST COST	ERGY COST		84327 5224 89551
ENERGY CONSUMPTION	MPTION	21527 MBTU	,	cost	\$89,551

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1983	PBELL E	NERGY SA ABSORPTION CH	VINGS O	MPBELL ENERGY SAVINGS OPPORTUNITY ECO.4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	ry Survey
LOCATION: BLDG 3214 TYPE/SIZE: New Natural Gas Engine Driven Chiller/210 Tons PUMPS: Two 10 HP Chilled Water, Two 7.5 HP Condenser Water	gine Driven Chille er, Two 7.5 HP Co	r/210 Tons ndenser Water			
PAGE 4 OF 5					
OPTION C: NEW NEW NATURAL	AL GAS ENGINE	GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	NERGY CONSUMP	TION	
000	COOLING	FULL	*		ENERGY
	SEASON	LOAD	FULL	CHILLER	CONSUMPTION
100/104	OCCURRENCES 2	2520000	100	, 	MBIU/IN)
	25	2520000	5	2	32
90/94		2520000	25	2	140
		2520000	8	1.82	416
80/84		2520000	80	1.85	557
		2520000	/9	1.75	641
70/74	865	2520000	79	1.07	089
60/69 60/64		2520000	45	 83.†	133
		252000	8	1.5	151
50/54	187	2520000	25	1.45	88
45/49		2520000	10	1.36	21
40/44	69	2520000	0	O	0
NEW NATIONAL GAS E	FNGINE DRIVE	NGINE DRIVEN CHILLER ENERGY			3445
CHILLED AND CONDENSER WATER PUMP ENERGY	ENSER WATER	PUMP ENERGY			0.00
TOTAL NEW NATURAL		GAS ENGINE DRIYEN CHILLER 8Y8TEM ENERGY	BTEM ENERGY		3634
NEW NATIONAL CAR	ENGINE DBIVE	V CHILLED ENEBRY	Tago		14780
CHILLED AND CONE	ENGINE DRIVE	CHILLED AND CONDENSER WATER PUMP ENERGY COST	1001		4571
TOTAL NEW NATURAL	AL GAB ENGINE	GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	ятем ененау с	78T	18351
ENERGY CONSUMPTION		3834 MBTU	<i>a</i>	cost	\$18,351
SHUT ENERGY SAVING	50	1780 COST		NET DOLLAR SAVINGS	S 571 900
	2	7601			

TITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp Estimator: Keith λ. Derrington Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:54

REPLACEMENT BLDG 3214 OPTION 3 CONTENTS PAGE 1

SUMMARY REPORTS	SUMMARY PAGE
PROJECT NOTES	
BID ITEM AND FACILITY SUMMARY	
PROJECT CWE SUNNARY	
CONTRACTOR DIRECT SUMMARY	
CONTRACTOR INDIRECT SUMMARY	
CSI DIVISION SUMMARY	
SYSTEMS SUMMARY	
EQUIPMENT SUMMARY	
LABOR SUMMARY	9
DETAILED ESTIMATE	DETAIL, PAGE
1. BUILDING TO THE 5 FOOT LINE	
AA. ELECTRICAL	
BA WECHANICAL	

* * * END TABLE OF CONTENTS * * *

DETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

DETAIL PAGE

TIME 11:35:5

BASE BI.

							DASE DI.
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	NANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EXALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5.8. 58.
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER	•					
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF			2.65 1	825.93 248		1461.51 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA						14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,27
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3214-3

TAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

DETAIL PAGE 2

TIME 11:35:54

1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

BASE BID

							BASE BIL
	-	HANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
	cs						
IN (80MM) P.E. SCE 40			4.59 459	0.18 18	3.83 383	0.19 19	8.7 9 87 9
O DEGREE LR WELD ELL STD. WT.							
IN	*** UNIT COSTS: *** 16.00 EA MSPFE	3.50 56	96.47 1,544	3.68 59	11.11 178	0.56	111.82 1,789
THE FULL SIZE BUTT WELD STD WT.							
IN	*** UNIT COSTS: *** 4.00 EA MSPFE	5.26 21	144.97 580	5.53 22	20.60 82	1.03	172.13 689
PLE DUTY VALVES							
TRIPLE DUTY VALVES	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,334
FIBERGLASS PIPE COVERING WITH JACKETS NOTE - COST DOES NOT	INCLUDE FITTINGS - FOR						
IN DIA. PIPE, 1 IN THICK	*** UNIT COSTS: *** 100.00 LF AASBC	0.08	2.51 251	0.03	1.91 191	0.10 10	4.55 455
	LLERS						
PUMPS							
HECHANICAL		284	7,905				
. MECHANICAL		284	7,905	403	112,306	5,615	126,229
	ERIALS AND METHODS ACK PIPE (ASTM A-53) AND FITTIN B IN (80MM) P.E. SCH 40 IN (100MM) P.E. SCH 40 DO DEGREE LR WELD ELL STD. WT. IN FEE FULL SIZE BUTT WELD STD WT. IN FINE DUTY VALVES TRIPLE DUTY VALVES FIBERGLASS PIPE COVERING WITH JACKETS NOTE - COST DOES NOT (.92M) FOR EACH FITTING PLUS IN DIA. PIPE, 1 IN THICK FION NATURAL GAS ENGINE DRIVEN CHIL	ERIALS AND METHODS ACK PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCH 40 *** UNIT COSTS: *** 100.00 LF MSPFE 4 IN (100MM) P.E. SCH 40 *** UNIT COSTS: *** 100.00 LF MSPFE 50 DEGREE LR WELD ELL STD. WT. 4 IN *** UNIT COSTS: *** 16.00 EA MSPFE FIRE FULL SIZE BUTT WELD STD WT. 4 IN *** UNIT COSTS: *** 4.00 EA MSPFE *** UNIT COSTS: *** 2.00 EA MSPFA 5 TRIPLE DUTY VALVES *** UNIT COSTS: *** 2.00 EA MSPFA *** UNIT COSTS: *** 100.00 LF AASBC **** UNIT COSTS: *** 100.00 LF AASBC **** UNIT COSTS: *** 100.00 LF AASBC **** UNIT COSTS: *** 100.00 LF AASBC ***** UNIT COSTS: *** 100.00 LF AASBC ***********************************	ERIALS AND METHODS ACK PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCH 40 *** UNIT COSTS: *** 100.00 LF MSPFE 17 18 IN (100MM) P.E. SCH 40 *** UNIT COSTS: *** 100.00 LF MSPFE 22 100.00 LF MSPFE 22 100.00 LF MSPFE 22 100.00 LF MSPFE 23 16.00 EA MSPFE 56 THE FULL SIZE BUTT WELD STD WT. 18 IN *** UNIT COSTS: *** 19 IN *** UNIT COSTS: *** 10 I	ERIALS AND METHODS (CX PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCH 40	ERIALS AND METHODS (CK PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCE 40	ERIALS AND METHODS CCK PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCE 40	ERIALS AND METHODS CCX PIPE (ASTM A-53) AND FITTINGS 3 IN (80MM) P.E. SCE 40

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3214-3

TAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. NECHANICAL

TIME 11:35:54

DETAIL PAGE 3

BASE BID

							DUNE DIE
DIVISION 15 MECHANICAL	QUANTITY UON CREW	MANER	LABOR	EQUIPHENT	MATERIAL	SALESTX	DIRECT \$
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		354	10,140	405	124,724	6,236	141,506
TOTAL BASE BID		354	10,140	405	124,724	6,236	141,506
TOTAL ADDITIVE		0	0	0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		354	10,140	405	124,724	6,236	141,506

* * * END OF DETAIL REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 3214-3 3-51

OJECT NOTES

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:54

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING

ABSORPTION CHILLERS IN SELECTED FACILITIES.

PROJECT ID: 3214-3 3-52

CURRENCY in DOLLARS

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ID ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

SUMMARY PAGE 2

TIME 11:35:54

BID ITEM 1 BUILDING TO THE 5 FOOT LINE

BASE BID

ID FACILITY	C	OST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	15,277	10.0% 1,528	0.0	7.5 \ 1,260	2.5 1 452	0.0%	18,516	18516.22
BA MECHANICAL	1.00 EA	126,229	10.0 \$ 12,623	0.0	7.5 \ 10,414	2.5 \ 3,732	0.0	152,998	152997.52
BID ITEM TOTAL	1.00 EA	141,506	14,151	0	11,674	4,183	0	171,514	171513.74
TOTAL BASE BID		141,506	14,151	0	11,674	4,183	0	171,514	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		141,506	14,151	0	11,674	4,183	0	171,514	

PROJECT ID: 3214-3

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT CWE SUNHARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:5

SUMMARY PAGE

 ID BID ITEM	QUANTITY DOM	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	171,514		171,514	171513.70
TOTAL CURRENT CONTRACT COST		171,514	0	171,514	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST		171,514	0	171,514	
Government-Furnished Property		0		0	
SUBTOTAL	•	171,514	0	171,514	
Contingencies	7.0%	12,006	0	12,006	
SUBTOTAL	•	183,520	0	183,520	
SIOH (S&A)	5.5\$	10,094	0	10,094	
CURRENT WORKING ESTIMATE	•	193,613	0	193,613	
					•
Estimated Construction Time	365 Days				

PROJECT ID: 3214-3

3-54

CURRENCY in DOLLARS

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:54

ONTRACTOR DIRECT SUNHARY

SUMMARY PAGE

ID	CONTRACTOR	PM	QUANTITY	UOH		LABOR		hat w/tx	TOTAL D ANOUNT			SUBCON W/OHEP	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	354	10,140	405	130,960	141,506	100.0	;		0	141,506
	TOTAL DIRECT				354	10,140	405	130,960	 141,506	100.0	;			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3214-3 3-55

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

SUMMARY PAGE

TIME 11:35:54

ONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PN	SUBTOTAL	OVERHEA AMOUNT							****** TOTAL AMOUNT		CT ****** UNIT COST
λλ	GENERAL/PRIME		141,506	 14,151	10.0	0.0	11,674	7.5	2.5%	0.0	171,514	100.0	171513.74
	TOTAL OVERHEAD & PROFIT			14,151	10.0		 11,674	7.5%					

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

SUMMARY PAGE

TIME 11:35:54

CSI DIVISION SUMMARY

ID CSI DIVISION	HANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT
15 MECHANICAL 16 ELECTRICAL	284 69	7,905 2,235	403 3	112,306 12,418	5,615 621	126,229 15,277
TOTAL DIRECT	354	10,140	405	124,724	6,236	141,506

CREW ID: ORL290

CURRENCY in DOLLARS PROJECT ID: 3214-3

YSTEMS SUMMARY

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:5

SUMMARY PAGE

					*********		**** TOTAL *
ID S	YSTEM	HANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT
09 H	LUMBING EATING, VENTILATION & AIR CONDIT NTERIOR ELECTRICAL	123 161 69	3,426 4,479 2,235	124 278 3	1,376 110,930 12,418	69 5,547 621	4,995 121,234 15,277
TOTA	L DIRECT	354	10,140	405	124,724	6,236	141,506

PROJECT ID: 3214-3 3-58

QUIPHENT SUMMARY

U.S. ARMY CORPS OF ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:5

SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS			HRLY RATE		**** TO	TAL *** COS!
EHI20	CRANE, 22 TON, HYDRAULIC, SP SMALL TOOLS WELDING MACHINE, ELEC, 300 AM				24.63 1.40 1.62	24.63 1.40 1.62	6 87 78	158 120 121
TOTAL	PROJECT EQUIPMENT HOURS						171	40:

ABOR SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

ECO-4: CHILLER REPLACEMENT BLDG 3214 OPTION 3

TIME 11:35:5

SUMMARY PAGE

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3214-3 3-60

Y SURVEY		ANNUAL	CONSUMPTION (MBTU/YR)	&	249	3160	4077	4437	4492	2972	1644 Pof	C60		0	23655	556 24212	94821	101151	\$101,151
MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993			CHILLER	0.55	0.55	0.55 55.55	0.55	0.55	0.55	0.55	8.5	S. S	0.55	0					cost
SAVINGS OF SIN CHILLER WITH HIG			FULL	100	180	38	8	29	52	43	S &	36	10	0		VERGY	Taco your	VERMI COST	JI.
NERGY SA) Tons nser Water		FULL LOAD BTU/HR	3840000	3840000	3840000	3840000	3840000	3840000	3840000	384000	2840000	3840000	3840000	NERGY	ISER WATER PUMP BASELINE ENERGY RGY	BASELINE ENERGY COST	TOMI DASELINE EI	24212 MBTU
FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	LOCATION: BLDG 6711 TYPE/SIZE: Carrier Single Stage Aborption Chiller/320 Tons MODEL/SERIAL NUMBER: 16.B036-604/744307616 PUMPS: Two 10 HP Chilled Water, Two 15 HP Condenser Water PAGE 1 OF 5	ABSORPTION CHILLER ENERGY BASELINE	COOLING SEASON OCCURRENCES	2		111	511		966	693	200	667	111	69	ABSORPTION CHILLER BASELINE ENERGY	CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY	ABSORPTION CHILLER BASELINE EI	TOTAL BASELINE ENERGY COST	ENERGY CONSUMPTION
FOR	LOCATION: BL TYPE/SIZE: Cal MODEL/SERIAL PUMPS: Two 10 PAGE 1 OF 5	ABSORPTION (BIN	100/104		85/89	80/84			62/69	55/50	50/54	45/49	40/44	ABSO	CHILL	ABSO	TOTA	ENERGY (

FORT CAMPBEI	ELL EN	ERGY SAVISOREHIII	VINGS OF	SELL ENERGY SAVINGS OPPORTUNITY REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	L ENERGY SAVINGS OPPORTUNITY SURVEY
LOCATION: BLDG 6711 TYPE/SIZE: New Natural Gas Engine Driven Chiller/320 Tons PUMPS: Two 10 HP Chilled Water, Two 10 HP Condenser We	ne Driven Chiller/320 Tons Two 10 HP Condenser Waler	0 Tons 1ser Water	·		
PAGE 4 OF 5					
OPTION C: NEW NEW NATURAL	GAS ENGINE DE	GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	ERGY CONSUMPT	NOI	
SNITOOD	g	FULL	×		ANNUAL
SEASON	z	LOAD	FULL	CHILLER	CONSUMPTION
BIN OCCURRENCES	ICE3	BTU/HR	LOAD	<u>200</u>	(MBTU/YR)
100/104	2	3840000	8	2	*
95/99	25	3840000	\$	2	48
80/84	Ξ	3840000	8	2	213
85/89	352	3840000	8	1.92	634
80/84	511	3840000	8	1.85	849
	664	3840000	67	1.75	978
70/74	866	3840000	52	1,67	1035
65/69	693	3840000	£3	1.65	694
60/64	471	3840000	35	53'1	406
55/59	299	3840000	S	÷.	230
50/54	261	3840000	25	1.45	130
45/49	==	3840000	•	1.36	31
40/44	69	3840000	ď	O	0
NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY	GINE DRIVEN C	HILLER ENERGY			5249
CHILLED AND CONDENSER WATER PUMP ENERGY	SER WATER PU	MP ENERGY			445
TOTAL NEW NATURAL	GAS ENGINE DA	GAS ENGINE DRIYEN CHILLER BYSTEM ENERGY	BTEM ENERGY		5694
		>>0	FoC		80000
NEW NAIUHAL GAS ENGINE DHIVEN CHILLEN ENERGY COST	GINE DHIVEN C	MILLEN ENERGY COST	100		ACC# 8
TOTAL NEW NATURAL	GAB ENGINE DE	GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	STEM ENERGY CO	ST	26222
ENERGY CONSUMPTION		5694 MBTU		COST	\$26,222
SOMMAS YOURS THE		48E47 MBTI (NET DOLLAR SAVINGS	060712
NE I ENERGI SAVINGS	•	10W /1col			

TTLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith \(\lambda\). Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6711-3

ABLE OF CONTENTS

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:16

CONTENTS PAGE

SUMMARY PAGE SUMMARY REPORTS BID ITEM AND FACILITY SUMMARY......2 CONTRACTOR INDIRECT SUKHARY......5 EQUIPMENT SUHWARY......8 DETAILED ESTIMATE DETAIL PAGE 1. BUILDING TO THE 5 FOOT LINE AA. ELECTRICAL.....

* * * END TABLE OF CONTENTS * * *

ETAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3
1. BUILDING TO THE 5 POOT LINE / AA. ELECTRICAL

TIME 09:45:16

DETAIL PAGE

BASE BIT

							DVOT DII
DIVISION 16 ELECTRICAL	QUANTITY UOH CREW	NANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS 16111 5100 IMC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS	POSED CONDITION. UNED TO BE FIELD BENT						
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR .CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEP		591.69 178	2.65	825.93 248	41.30 12	1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA		1650.50 1,651	0.00	12000.00		14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

DETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 09:45:1

DETAIL PAGE

BASE BI

DIVISION 15 NECHANICAL	QUANTITY UON CREW	MANER		EQUIPMENT			DIRECT
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND	FITTINGS						
CD=4 HV 2302 3 IN (80MH) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18	3.83 383		8.7 87
CD=4 HV 2305 6 IN (150MM) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE	0.32	8.89 889	0.34 34	8.44 844		
15061 2320 90 DEGREE LR WELD ELL STD	. WI.						
CD=4 HV 2323 6 IN WC=0800	*** UNIT COSTS: *** 16.00 EA MSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36 22	193.8 3,10
15061 2340 TEE FULL SIZE BUTT WELD S	TD WT.						•
CD=4 HV 2343 6 IN WC=0800	*** UNIT COSTS: *** 4.00 EA MSPFE						288.0 1,15
15100 9100 TRIPLE DUTY VALVES							
CD=3 HV 9101 6" TRIPLE DUTY VALVES WC=0900	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	. 1.34	1015.00 2,030	50.75 102	1166.8 2,33
	G WITH FIRE RETARDANT S NOT INCLUDE FITTINGS - FOR PLUS 4 LF (1.2M) FOR EACH F			•	·		
CD=4 HV 1011 6 IN DIA. PIPE, 1-1/2 IN 1 WC=0800	THK *** UNIT COSTS: *** 100.00 LF AASBC	0.11	3.30 330	0.04	3.17 317	0.16 16	6.6 66
15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVE	EN CHILLERS						
CD=3 HV 3001 320 TON NAT GAS ENGINE INC WC=0900 EXISTING CHILLER DENOLITION	CLUDING *** UNIT COSTS: *** ON 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	156800.00 156,800		172233.6 172,23
15670 5000 PUMPS							
CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL WC=0900 CASE PUMP	L SPLIT *** UNIT COSTS: *** 2.00 EA MSPFA						3453.3 6,90
TOTAL DIVISION 15 MECHANICAL		472	13,060	715	166,959	8,348	189,08
TOTAL FACILITY BA. MECHANICAL				715			

PROJECT ID: 6711-3 3-66

DETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

DETAIL PAGE

BASE BII

TIME 09:45:10

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6711-3 3-67

POJECT NOTES

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:16

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING

ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6711-3

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ID ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

SUMMARY PAGE :

RID THEN 1 BUILDING TO THE 5 FOOT LINE

BASE BII

TIME 09:45:1:

BID ILEM I BOILDING	10 1111 3 1001 1	IND							
ID FACILITY	C	OST TO PRN	OVERHEAD	HONE OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EX	15,277	10.0 \$ 1,528	0.0	7.5 % 1,260	2.5 \$ 452	0.0	18,516	18516.22
BA MECHANICAL	1.00 EA	189,082	10.08	0.0	7.5 % 15,599	2.5 \ 5,590	0.0	229,179	229179.31
BID ITEM TOTAL	1.00 EX	204,359	20,436	0	16,860	6,041	0	247,696	247695.53
TOTAL BASE BID		204,359	20,436	0	16,860	6,041	0	247,696	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		204,359	20,436	0	16,860	· 6,041	0	247,696	

CREW ID: ORL290

PROJECT CWE SUNNARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3 TIME 09:45:16

SUMMARY PAGE

	ID BID ITEM	QUANTITY UOK	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	247,696		247,696	247695.50
•	TOTAL CURRENT CONTRACT COST		247,696	0	247,696	
	Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
	ESCALATED CONTRACT COST		247,696	0	247,696	
	Government-Purnished Property		0		0	
	SUBTOTAL	•	247,696	0	247,696	
	Contingencies	7.0%	17,339	0	17,339	
	SUBTOTAL	•	265,034	0	265,034	
	SIOH (S&A)	5.5%	14,577	0	14,577	
	CURRENT WORKING ESTIMATE	•	279,611	0	279,611	
				•		
	Estimated Construction Time	365 Days				

CURRENCY in DOLLARS PROJECT ID: 6711-3

3-70

ONTRACTOR DIRECT SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:1t

SUNNARY PAGE

ID	CONTRACTOR	PH	QUANTITY	HOU	MANHRS	LABOR	EQUIPMENT	MAT W/TX	TOTAL DI ANOUNT		* SUBCON W/OH&P		SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	541	15,295	717	188,346	204,359	100.0	t	0	204,359
	TOTAL DIRECT				541	15,295	717	188,346	 204,359	100.0			

U.S. ARMY CORPS of ENGINEERS M-CACES

TIME 09:45:1

ONTRACTOR INDIRECT SUMMARY

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

SUMMARY PAGE

ID	CONTRACTOR	SUBTOTAL	OVERHEA AMOUNT	_		PROFIT AMOUNT				****** TOTAL ANOUNT		CT ****** UNIT COS
λλ	GENERAL/PRIME	204,359	20,436	10.0	0.0	16,860	7.5	2.5%	0.0	247,696	100.0	247695.5
	TOTAL OVERHEAD & PROFIT		 20,436	10.0		 16,860	7.5%					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6711-3

3-72

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

SUMMARY PAGE

TIME 09:45:1t

CSI DIVISION SUNMARY

****	ID CSI DIVISION	KANEOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT	
	15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715	166,959 12,418	8,348 621	189,082 15,277	
•	TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

STEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:16

SUMMARY PAGE

						**** TOTAL *	
ID SYSTEM	KANEOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT	
08 PLUMBING 09 HEATING, VENTILATION & AI 11 INTERIOR ELECTRICAL	187 R CONDIT 285 69	5,183 7,877 2,235	189 526 3	2,129 164,830 12,418	106 8,242 621	7,608 181,474 15,277	
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

QUIPHENT SUNHARY

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:10

SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH	BOOK OP - EXPENSE	HRLY RATE	UPB RATE	**** TOTA HOURS	L ***
ENI 20	CRANE, 22 TON, HYDRAULIC, SP SMALL TOOLS WELDING MACHINE, ELEC, 300 AM					24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	301 200 21
TOTAL	PROJECT EQUIPMENT HOURS							288	71

ABOR SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6711 OPTION 3

TIME 09:45:16

SUMMARY PAGE

CRA	FT DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	HRLY -		**** TOTAL HOURS	**** COST
LLI LOI LSI	SBW ASBESTOS WORKER JEC ELECTRICIANS JER LABORER/HELPER JENE EQ OPER, MEDIUM JESTEAM/PIPEFITTERS JEAL PROJECT MANHOURS	20.45 20.50 17.25 21.40 20.95	0.0\$ 0.0\$ 0.0\$ 0.0\$	24.0\$ 24.0\$ 24.0\$ 24.0\$ 24.0\$	7.49 3.07 6.20	0.00 0.00 0.00	31.27 32.91 24.46 32.74 29.83	24.86 25.79 18.52 21.87 26.12	62 12 387 1	330 2,235 1,505 403 0,821

* * * END OF SUMMARY REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6711-3 3-76

CREW ID: ORL290

FOR	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	NERGY SA	SAVINGS OF SILVEN WITH HIGH SILVEN SI	PORTUNITH EFFICIENCY UNIT	L ENERGY SAVINGS OPPORTUNITY SURVEY
LOCATION: BLI TYPE/SIZE: Carr MODEL/SERIAL N PUMPS: One 7:E PAGE 1 OF 5	LOCATION: BLDG 6718. TYPE/SIZE: Carrier Single Stage Aborption Chiller/140 Tons MODEL/SERIAL NUMBER: 16.B014-604/744307614 PUMPS: One 7.5 HP Chilled Water, One 10 HP Condenser Water	/140 Tons 614 ondenser Water			
ABSORPTION C	ABSORPTION CHILLER ENERGY BASELINE				
	COOLING	FULL	FULL	CHILLER	ENERGY CONSUMPTION
BIN	OCCURRENCES	BTU/HR	LOAD	COP	(MBTU/YR)
95/99	25	1680000	5.5	0.49	122
200000	111	1680000	18	0.49	544
85/89 80/84	85/89 352 87/84 511	1680000 1680000	8 8	0.49	1352
75/79	664	1680000	67	0.49	2179
70/74	998	1680000	52	0.49	2206
69/59	693	1680000	£3.	0.49	1460
60/64	60/64	1680000	ક્ષ ક	0.49	, , , , , , , , , , , , , , , , , , ,
55/59	299	1680000	8 8	0.49	439
50/54	181	1680000	55	0.49	142
45/49	11.	1680000	01	0.49	8
40/44	60	1680000	0	D	2
ABSOL	ABSORPTION CHILLER BASELINE ENERGY	ENERGY			11616
CHILL	CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY	WATER PUMP BASELINE ENERGY	IERGY		195 11811
ABSO		ELINE ENERGY COST			46466
CHILL	CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY COST	WATER PUMP BASELINE ENERGY COST	IERGY COS I		2286 48751
ENERGY	ENERGY CONSUMPTION	UTBM 11811	م ا	COST	\$48,751
		1			

IY SURVEY			ANNUAL	CONBUMPTION	(MBTU/YR)	2.	12	977	37.6	427	150	303	178	180		7	0	2207	167	2463	9187	1959	111146	\$11,146	909'28\$
PBELL ENERGY SAVINGS OPPORTUNITY O4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS		NOIL		CHILLER	COP	2	2	7 8	76 ¥	1.75	1.67	1.65	1.56	1.5	1.45	1.36	0						OST	COST	NET DOLLAR SAVINGS
AVINGS O		ENERGY CONSUMP	*	FULL	TOYD	100	8 3	38	2	74	52	43	35	30	25	01	0	GY		BYSTEM ENERGY	GY COST	Tool	SYSTEM ENERGY C	мвти	MBTU
ENERGY S CEABSORPTION (ngine Driven Chiller/140 Tons Ibr, One 7.5 HP Condenser Water	INF DRIVEN CHILLES	FULL	LOAD	BTU/HR	1680000	1680000	1680000	1680000	1580000	1680000	1680000	1680000	1680000	1680000	1680000	(680000	ENGINE DRIVEN CHILLER ENERGY	TER PUMP ENERGY	AL GAS ENGINE DRIVEN CHILLER BYSTEM ENERGY	VEN CHILLER ENER	DENGINE DIN TEN CHIEFEN ENERGY COET	INE DRIVEN CHILLER	2463 h	9348
FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	BLDG 6718 New Natural Gas Er ne 7.5 HP Chilled We	PAGE 4 OF 5 OPTION C: NEW NEW NATURAL GAS FNGINE DRIVEN CHILLER ENERGY CONSUMPTION	SNIIOOO	SEASON	OCCURRENCES	100/104		111	200000000000000000000000000000000000000	110	8888		124	299	181	=	69	NEW NATURAL GAS ENGINE DRI	CHILLED AND CONDENSER WATER PUMP ENERGY	TOTAL NEW NATURAL GAS ENG	NEW NATIIBAL GAS ENGINE DRIVEN CHILLER ENERGY COST	MEN INTO COMPENSED WAT	CHILLED AND CONDENSEN MAIER FOMF ENEMEL SYSTEM ENERGY COST	ENERGY CONSUMPTION	NET ENERGY SAVINGS
F(LOCATION: TYPE/SIZE: PUMPS: Or	PAGE 4 OF 5			BIN	100/104	95/99	\$6/0 6	85/89	80/84	42/C/	62/69	60/64		50/54		200000							ENE	N N

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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> PROJECT ID: 6718-3 3-79

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:1:
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DETAILED ESTIMATE 1. BUILDING TO THE 5 FOOT LINE AA. ELECTRICAL. BA. MECHANICAL.		1

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TAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

DETAIL PAGE

TIME 11:58:18

ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

							DV2F DII
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	MANHR	LABOR	EQUIPMENT	HATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EXI ALL 1/2 IN AND 3/4 IN ELBOWS ASSI							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 NLF EELEF			2.65 1	825.93 248		1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA			0.00			14250.50 14,251
NOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

TAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 11:58:18

DETAIL PAGE 2

BASE BID

						BASE BID
QUANTITY UOM CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
NGS						
*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19 19	8.79 879
*** UNIT COSTS: *** 100.00 LF MSPFE	0.22	5.92 592	0.23 23	5.42 542		11.84
*** UNIT COSTS: *** 16.00 EA MSPFE	3.50 56	96.47 1,544	3.68 59	11.11 178	0.56 9	111.82 1,789
•						
*** UNIT COSTS: *** 4.00 EA MSPFE	5.26 21	144.97 580	5.53 22	20.60 82	1.03	
*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,334
INCLUDE FITTINGS - FOR	R FITTIN	GS ADD 3 LE JOINT				
*** UNIT COSTS: *** 100.00 LF AASBC	0.08	2.51 251	0.03	1.91 191	0.10 10	4.55 455
ILLERS						
NG *** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	68600.00 68,600	3430 3,430	75978.72 75,979
						3453.33 6,907
	284	7,905	403	78,006	3,900	90,214
,	284	7,905	403	78,006	3,900	90,214
	*** UNIT COSTS: ***	*** UNIT COSTS: *** 0.17 100.00 LF MSPFE 17 *** UNIT COSTS: *** 0.22 100.00 LF MSPFE 22 *** UNIT COSTS: *** 3.50 16.00 EA MSPFE 56 *** UNIT COSTS: *** 5.26 4.00 EA MSPFE 21 *** UNIT COSTS: *** 3.33 2.00 EA MSPFA 7 ### FIRE RETARDANT INCLUDE FITTINGS - FOR FITTIN 4 LF (1.2M) FOR EACH FLANGED *** UNIT COSTS: *** 0.08 100.00 LF AASBC 8 ILLERS NG *** UNIT COSTS: *** 134 1.00 EA MSPFO 134 IT *** UNIT COSTS: *** 10.00 2.00 EA MSPFA 20	*** UNIT COSTS: *** 0.17			

ETAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. NECHANICAL

TIME 11:58:18

DETAIL PAGE

BASE BIL

						DANE DIE
QUANTITY UOH CREW	KANHR	Labor	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
		*******				*******
	354	10,140	405	90,424	4,521	105,491
	354	10.140	405	90.424	4.521	105,491
	0	0	0	0	0	0
	354	10,140	405	90,424	4,521	105,491
	QUANTITY DOM CREW	354 354 0	354 10,140 	354 10,140 405 354 10,140 405 0 0 0	354 10,140 405 90,424 354 10,140 405 90,424 0 0 0 0 0	354 10,140 405 90,424 4,521 354 10,140 405 90,424 4,521 0 0 0 0 0

* * * END OF DETAIL REPORT * * *

ROJECT NOTES

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

PROJECT ID: 6718-3 3-84

CURRENCY in DOLLARS

U.S. ARMY CORPS of ENGINEERS N-CACES

Wed 01 Sep 1993

U.S. ARMY CURPS OF ENGINEERS .. CHILD DEDITIONS OPPORTUNITY SURVY / FT CAMPBELL, KY

FID ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

SUMMARY PAGE .

TIME 11:58:1

BID ITEM 1 BUILDING	TO THE 5 FOOT LINE							BASE BII
ID FACILITY	COST TO PRI	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COS!
AA ELECTRICAL	1.00 EA 15,277	10.0% 1,528	0.0\$	7.5 \ 1,260	2.5 \ 452	0.0%	18,516	18516.2
BA MECHANICAL	1.00 EA 90,214	10.0 \$ 9,021	0.0	7.5% 7,443	2.5 % 2,667	0.0\$	109,345	109345.09
BID ITEM TOTAL	1.00 EA 105,491	10,549	0	8,703	3,119	0	127,861	127861.31
TOTAL BASE BID	105,491	10,549	0	8,703	3,119	0	127,861	
TOTAL ADDITIVE	0	0	0	0	0	0	0	
TOTAL INCL ADD	105,491	10,549	0	8,703	3,119	0	127,861	

CURRENCY in DOLLARS

PROJECT ID: 6718-3 3-85

ROJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUMMARY PAGE

 ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	127,861		127,861	127861.30
TOTAL CURRENT CONTRACT COST	•	127,861	0	127,861	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST		127,861	0	127,861	
Government-Furnished Property		. 0		0	
SUBTOTAL	•	127,861	0	127,861	
Contingencies	7.0%	8,950	. 0	8,950	
SUBTOTAL	-	136,812	0	136,812	
SIOH (S&A)	5.5%	7,525	0	7,525	
CURRENT WORKING ESTIMATE	-	144,336	0	144,336	
Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6718-3

3-86

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUMMARY PAGE

ONTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PM	QUANTITY	UON	KANERS		EQUIPMENT	HAT W/TX			* SUBCON W/OH&P	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	354	10,140	405	94,945	105,491	100.0\$		0	105,491
	TOTAL DIRECT				354	10,140	405	94,945	105,491	100.0%			

CURRENCY in DOLLARS

PROJECT ID: 6718-3 3-87

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUMMARY PAGE

NTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PK	SUBTOTAL	** OVERHE				FIT *	**** PCT	BOND }	OTHR:	****** TOTAL (AMOUNT	CONTRA PCT	CT ******* UNIT COST
 11	GENERAL/PRIME		105,491	10,549	10.0	0.0	8,	03 7	7.5	2.5%	0.0	127,861 1	00.0	127861.31
	TOTAL OVERHEAD & PROFIT		-	10,549	10.03		8,	03	7.5					

SI DIVISION SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:1.

SUNNARY PAGE

 ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT	
 15 MECHANICAL 16 ELECTRICAL	284 69	7,905 2,235	403	78,006 12,418	3,900 621	90,214 15,277	
TOTAL DIRECT	354	10,140	405	90,424	4,521	105,491	

YSTEMS SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:1

SUMMARY PAGE

		~~~~~				**** TOTAL *
ID SYSTEM	HANHOURS	LABOR	EQUIPHENT	HATERIAL	SALES TAX	DIRECT
08 PLUMBING 09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	123 161 69	3,426 4,479 2,235	124 278 3	1,376 76,630 12,418	69 3,832 621	4,995 85,219 15,277
TOTAL DIRECT	354	10,140	405	90,424	4,521	105,491

UIPHENT SUMMARY

## U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE HRS	*** BOOK V	ADJ FACTOR OWNS OVTH	ADJUSTD OWNRSHP	BOOK OP EXPENSE	HRLY RATE	UPB RATE		COS1
ECR25 ENI20 EWE10	SHALL TOOLS						24.63 1.40 1.62	24.63 1.40 1.62	6 87 78	158 121 127
TOTAL	PROJECT EQUIPMENT HOURS								171	405

Wed 01 Sep 1993 BOR SUMMARY U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6718 OPTION 3

TIME 11:58:18

SUNNARY PAGE

CRAFT	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	- HRLY RATE		**** TOTAL	L **** COST	
LASBW LELEC LLABR LOEME LSPFI	LABORER/HELPER EQ OPER, MEDIUM	20.45 20.50 17.25 21.40 20.95	0.08 0.08 0.08 0.08	24.0\$ 24.0\$ 24.0\$ 24.0\$	7.49 3.07 6.20	0.00 0.00 0.00	31.27 32.91 24.46 32.74 29.83	24.86 25.79 18.52 21.87 26.12	8 69 32 6 238	251 2,235 783 210 6,662	
TOTAL	PROJECT MANHOURS								354	10,140	

* * * END OF SUMMARY REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6718-3 3-92

CREW ID: ORL290

FORT (	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY  ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	NERGY SA	SAVINGS OF ON CHILLER WITH HIGH	PORTUNIT EFFICIENCY UNI	Y SURVEY
LOCATION: BLDG 6726 TYPE/SIZE: Carrier Singl MODEL/SERIAL NUMBER PUMPS: Two 10 HP CHII PAGE 1 OF 5	LOCATION: BLDG 6726 TYPE/SIZE: Carrier Single Stage Aborption Chiller/320 Tons MODEL/SERIAL NUMBER: 16.B036-604/744307615 PUMPS: Two 10 HP Chilled Water, Two 15 HP Condenser Water	/320 Tons 615 ndenser Water	·		
ABSORPTION CHILL	ABSORPTION CHILLER ENERGY BASELINE				ANNOAL
	COOLING	FULL	FULL	CHILER	CONSUMPTION
BIN	OCCURRENCES	8TU/HR 3840000	10AD	9.85   0.85	(MB10/1H)
95/99		3840000	100	0.55 0.55	249
90/94 85/89	352	3840000	<u>2</u> 8	0.55	3160
80/84	511	3840000	80 67	0.55	4077
70/7	/5//9 70/74	3840000	52	0.55	4492
62/69	693	3840000	43	0.55	2972
	471	3840000	ક્ક હ	0.55 53.0	2 2 2 3
	299	3840000	સ્ટ સ્ટ	0.55	491
50/54 45/49	111	3840000	10	0.55	111
	69	3840000	0	0	0
TABSORPT	ABSORPTION CHILLER BASELINE ENERGY	ENERGY			23655
CHILLED A TOTAL BA	CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY TOTAL BASELINE ENERGY	R PUMP BASELINE EN	ERGY		558 24212
ABSORPTI CHILLED / TOTAL BA	ABSORPTION CHILLER BASELINE ENERGY COST CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY COST TOTAL BASELINE ENERGY COST	ENERGY COST R PUMP BASELINE ENI	EHGY COST		94621 6530 101151
ENERGY CONSUMPTION	SUMPTION	24212 MBTU	a	COST	\$101,151

TY SURVEY			ANNUAL	CONSUMPTION	(MBTU/YR)	4. 64.	218	634	549 976	1035	694	408	230	36. F	0	5249 445 5694	20998 5224 26222	\$26,222	38 \$74,929
O 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS			IPTION	CHILLER	COP	2 2	2	1.92	1.85	1.67	1.65	1.58	5.7	1.36	0		COST	COST	NET DOLLAR SAVINGS
SAVINGS C CHILLER WITH HI AUGUST 1883			er energy consum	FULL	LOAD	82	001	<b>%</b>	60	52	43	35	30	25 10	0	IGY R. BYBTEM ENERGY	AGY COST COST R.SYSTEW ENERGY	мвти	
ENERGY S	igine Driven Chiller/320 Tons ler, Two 10 HP Condenser Water		GINE DRIVEN CHILLE	LOAD	BTU/HR	3840000	3840000	3840000	\$840000 3840000	3840000	3840000	3840000	3840000	3840000	3840000	ENGINE DRIVEN CHILLER ENERGY ENSER WATER PUMP ENERGY A. GAS ENGINE DRIYEN CHILLERS	ENGINE DRIVEN CHILLER ENERGY COST NENSER WATER PUMP ENERGY COST AL GAR ENGINE DRIVEN CHILLER SYSTEK	5694	18517 MBTU
FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY  ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1883	LOCATION: BLDG 6726 TYPE/SIZE: New Natural Gas Engine Driven Chiller/320 Tons PUMPS: Two 10 HP Chilled Water, Two 10 HP Condenser Water		OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	BEASON	OCCURRENCES	2	11		511	866		124	2000000	197	40/44	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CHILLED AND CONDENSER WATER PUMP ENERGY TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST CHILLED AND CONDENSER WATER PUMP ENERGY COST TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	ENERGY CONSUMPTION	NET ENERGY SAVINGS
FOF	LOCATION: B TYPE/SIZE: N PUMPS: Two	PAGE 4 OF 5	OPTION C: N		BIN	100/104	90/94	85/89	80/84	70/74	62/69	60/64	- 8	50/54	40/44	NEW CHII	NEV	ENERGI	NETE

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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> PROJECT ID: 6726-3 3-95

CURRENCY in DOLLARS

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## U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

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ETAILED ESTIKATE

### U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

DETAIL PAGE

TIME 09:59:3

BASE BIT

							BYZE BII
DIVISION 16 ELECTRICAL	QUANTITY DON CREW	KANER	Labor	EQUIPMENT	MATERIAL	SALESTX	DIRECT S
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF			2.65 1	825.93 248		1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA		1650.50 1,651		12000.00		14250.50 14,251
FOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL PACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6726-3 3-97

TAILED ESTIMATE

### U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

DETAIL PAGE 2

TIME 09:59:35

	21 20122110 10	220 5 1002 52.15 / 2.10						BASE BID
DIVISION 15 MECHANICAL		QUANTITY UON CREW	nanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
15050 BASIC MATERIALS AND 15061 2300 BLACK PIPE (	METHODS ASTN A-53) AND FITTI	NGS						
CD=4 HV 2302 3 IN (80MM WC=0800	i) P.E. SCH 40	*** UNIT COSTS: *** 100.00 LF MSPFE		4.59 459	0.18		0.19 19	8.79 879
CD=4 HV 2305 6 IN (150M WC=0800	M) P.E. SCH 40	*** UNIT COSTS: *** 100.00 LF MSPFE			0.34 34			
15061 2320 90 DEGREE	LR WELD ELL STD. WT.							
CD=4 HV 2323 6 IN WC=0800		*** UNIT COSTS: *** 16.00 EA MSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36	193.85 3,102
15061 2340 TEE FULL S	IZE BUTT WELD STD WT	•						
CD=4 HV 2343 6 IN WC=0800		*** UNIT COSTS: *** 4.00 EA MSPFE	8.70 35	239.51 958	9.14 37	37.50 150	1.88	288.02 1,152
15100 9100 TRIPLE DUTY	VALVES							
CD=3 HV 9101 6" TRIPLE WC=0900	DUTY VALVES	*** UNIT COSTS: *** 2.00 EA HSPFA	3.33 7	99.77	1.34	1015.00 2,030	50.75 102	1166.86 2,334
JACKETS		H FIRE RETARDANT INCLUDE FITTINGS - FOI 4 LF (1.2M) FOR EACH I						
CD=4 HV 1011 6 IN DIA. WC=0800	PIPE, 1-1/2 IN THK	*** UNIT COSTS: *** 100.00 LF AASBC	0.11 11	3.30 330	0.04	3.17 317	0.16 16	6.67 667
15650 REFRIGERATION 15670 3000 NATURAL	GAS ENGINE DRIVEN CH	ILLERS						·
CD=3 HV 3001 320 TON NA WC=0900 EXISTING C	T GAS ENGINE INCLUDI HILLER DEMOLITION	NG *** UNIT COSTS: *** 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	156800.00 156,800	7840 7,840	172233.69 172,234
15670 5000 PUMPS								
CD=3 HV 5001 10 HP CENT WC=0900 CASE PUMP	RIFUGAL VERTICAL SPL	IT *** UNIT COSTS: *** 2.00 EA MSPFA		299.30 599	4.03	3000.00 6,000	150.00 300	3453.33 6,907
TOTAL DIVISION 15 NECHANIC	CAL		472	13,060	715	166,959	8,348	189,082
TOTAL FACILITY BA. HECHANI	CAL		472	13,060	715	166,959	8,348	189,082

CREW ID: ORL290

TAILED ESTIMATE

## U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

DETAIL PAGE

TIME 09:59:35

1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

BASE BID

							DASE DID
DIVISION 15 MECHANICAL	QUANTITY UOH CREW	nanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		541	15,295	717	179,377	8,969	204,359
TOTAL BASE BID		541	15,295	717	179,377	8,969	204,359
TOTAL ADDITIVE		0	0	0	0	0	. 0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	179,377	8,969	204,359

* * * END OF DETAIL REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6726-3

3-99

ROJECT NOTES

### U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:35

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6726-3 3-100

U.S. ARMY CORPS OF ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
D ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

SUMMARY PAGE 2

TIME 09:59:35

BID ITEM 1 BUILDING	TO THE 5 FOOT LI	NE							BASE BID
ID FACILITY	α	ST TO PRN	OVERHEAD	HOME OPC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	15,277	10.0%	0.0	7.5 <b>\</b> 1,260	2.5 <b>\</b> 452	0.0	18,516	18516.22
BA NECHANICAL	1.00 EA	189,082	10.0% 18,908	0.0	7.5 <b>\</b> 15,599	2.5 <b>\</b> 5,590	0.0	229,179	229179.31
BID ITEM TOTAL	1.00 EA	204,359	20,436	0	16,860	6,041	. 0	247,696	247695.53
TOTAL BASE BID	-	204,359	20,436	0	16,860	6,041	0	247,696	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD	_	204,359	20,436	0	16,860	6,041	0	247,696	

PROJECT ID: 6726-3

ROJECT CWE SUNDARY

# U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:3:

SUMMARY PAGE

ID BID ITEM	MOU YTITHAUQ	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 Ελ	247,696		247,696	247695.50
TOTAL CURRENT CONTRACT COST	•	247,696	0	247,696	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000		0	0	0	
ESCALATED CONTRACT COST		247,696	0	247,696	
Government-Furnished Property		0		0	
SUBTOTAL	•	247,696	0	247,696	
Contingencies	7.0\$	17,339	0	17,339	
SUBTOTAL	•	265,034	0	265,034	
SIOH (S&A)	5.5%	14,577	0	14,577	
CURRENT WORKING ESTIMATE	-	279,611	0	279,611	
Estimated Construction Time	365 Days				

PROJECT ID: 6726-3 3-102

CREW ID: ORL290

CURRENCY in DOLLARS

ONTRACTOR DIRECT SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:35

SUMMARY PAGE

ID	CONTRACTOR	PM	QUANTITY U	ЮK	naners		EQUIPMENT				* SUBC		SUBTOTAL
<u></u>	GENERAL/PRIME		1.00 E	ZA -	541	15,295	717	188,346	 204,359	100.0		 0	204,359
	TOTAL DIRECT				541	15,295	717	188,346	 204,359	100.0			

PROJECT ID: 6726-3 3-103

ONTRACTOR INDIRECT SUMMARY

U.S. ARMY CORPS OF ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:35

SUMMARY PAGE

ID	CONTRACTOR	PM	SUBTOTAL	OVERHEA AMOUNT			PROFIT AMOUNT				ATOT ******	L CONTR	ACT ****** UNIT COST
λλ	GENERAL/PRIME		204,359	 20,436	10.0	0.0	 16,860	7.5	2.5	0.0	247,696	100.0	247695.54
	TOTAL OVERHEAD & PROFIT			 20,436	10.0		16,860	7.5					

PROJECT ID: 6726-3 3-104

CSI DIVISION SUNMARY

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:3

SUNMARY PAGE

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT	
15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715 3	166,959 12,418	8,348 621	•	
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

SYSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:3

SUMMARY PAGE

 						***** TOTAL *	
ID SYSTEM	MANHOURS	LABOR	EQUIPHENT	MATERIAL	SALES TAX	DIRECT	
08 PLUMBING 09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	187 285 69	5,183 7,877 2,235	189 526 3	2,129 164,830 12,418	106 8,242 621	7,608 181,474 15,277	
 TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: 6726-3 3-106

QUIPHENT SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3 TIME 09:59:35

SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS			ADJUSTD OWNRSHP	BOOK OP EXPENSE	HRLY RATE		**** TOTAL	COST
ENI20	CRANE, 22 TON, HYDRAULIC, SP ( SMALL TOOLS WELDING MACHINE, ELEC, 300 AM						24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	303 200 214
TOTAL	PROJECT EQUIPMENT HOURS								288	717

FOR SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6726 OPTION 3

TIME 09:59:35

SUMMARY PAGE

							- HRLY	UPB	**** TOT	L ****	
CRAFT DESCRIPT	ION	BASE	OVERTH	TXS/INS	FRNG	TRVL	RATE	RATE	HOURS	COST	
LASBW ASBESTOS LELEC ELECTRIC LLABR LABORER/I LOEME EQ OPER, LSPFI STEAM/PI	IANS HELPER	20.45 20.50 17.25 21.40 20.95	0.0\$ 0.0\$ 0.0\$ 0.0\$	24.0% 24.0% 24.0% 24.0%	7.49 3.07 6.20	0.00 0.00 0.00	31.27 32.91 24.46 32.74 29.83	24.86 25.79 18.52 21.87 26.12	11 69 62 12 387	330 2,235 1,505 403 10,821	
TOTAL PROJECT H									541	15,295	

* * * END OF SUMMARY REPORT * * *

FORT CA		NERGY SA	SAVINGS O	MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	IY SURVEY
LOCATION: BLDG 6732 TYPE/SIZE: Carrier Single MODEL/SERIAL NUMBER: PUMPS: Two 10 HP Chiller PAGE 1 OF 5	LOCATION: BLDG 6732 TYPE/SIZE: Carrier Single Stage Aborption Chiller/320 Tons MODEL/SERIAL NUMBER: 16.B036-604/744307585 PUMPS: Two 10 HP Chilled Water, Two 15 HP Condenser Water	/320 Tons 585 ndenser Water			
ABSORPTION C	ABSORPTION CHILLER ENERGY BASELINE				N N N N N N N N N N N N N N N N N N N
	COOLING	FULL	FULL	CHILLER	ENERGY
100/104	OCCURRENCES	BTU/HR 3840000	LOAD	COP 0.55	(MBTU/YR)
8 8	25	3840000	100	0.55	
	111	3840000	180	0.55	1107
80/84	352 511	3840000 3840000	88 88	0.55	3160
	664	3840000	67	0.55	4437
	998	3840000	52	0.55	4482
65/69	693	3840000	43	0.55	2972
55/59	1/1/	384000	3 8	0.33 55.0	24. 54. A.
50/54	161	3840000	25	0.55	
45/49	111	3840000	10	0.55	111
40/44	69	3840000	0	0	0
ABSOF	ABSORPTION CHILLER RASELINE ENERGY	NERGY			23.855
CHILLE		WATER PUMP BASELINE ENERGY	JERGY		558
7 2 2	OTAL BASELINE ENERGY				24212
ABSOP CHILLE TOTAL	ABSORPTION CHILLER BASELINE EI CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY COST	ELINE ENERGY COST I WATER PUMP BASELINE ENERGY COST COST	VERGY COST		94621 6530 101151
ENERGY CA	ENERGY CONSUMPTION	24212 MBTU	2	cosr	\$101,151

FORT CAMI  LOCATION: BLDG 8732 TYPE/SIZE: New Natural Gas E PUMPS: Two 10 HP Chilled Wa PAGE 4 OF 5  OPTION C: NEW NEW NATURAL GAS 100/104 95/99 90/94 85/89 80/84 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79 75/79	FORT CAMPBELL ENERGY SAVINGS OPPINGS 11993  CLOCATION: BLDG 6732  TYPE/SIZE. New Natural Gas Engline Driven Chille-/320 Tone PUMPS: Two 10 HP Chilled Water, Two 10 HP Condenser Water PAGE 4 OF 5  OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION COOLING BEIN COCURS COOLING BEIN BEIN COCURS COOLING BEIN BEIN BEIN COCURS COOLING BEIN BEIN BEIN COCURS COOLING BEIN BEIN BEIN BEIN BEIN BEIN BEIN BEIN	MPBELL ENERGY SAVINGS OPPORTUNITY SURVEY  ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS  SI AUGUST 1993  STANGUST 1993  TUTAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION  CURRENCES  BILUMN  COPP  COPP	NERGY CONSUMPT  ** FULL LOAD 100 100 100 100 100 100 100 100 100 10	PORTUNI HEFFICIENCY UNI COP 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1.95 1.75 1.75 1.75 1.75 1.75 1.75 1.75 1.7	ANNUAL ENERGY CONSUMPTION (MBTU/MB) 48 213 213 834 834 834 834 834 834 834 834 834 83
ENERGY CC	ENERGY CONSUMPTION	5694 MBTU	a.	cost	\$26,222
NET ENERGY SAVII	RGY SAVINGS	18517 MBTU		NET DOLLAR SAVINGS	S \$74,929

TITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3 TIME 10:07:38

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DETAILED ESTIMATE	DETAIL	PAGE
1. BUILDING TO THE 5 FOOT LINE AA. ELECTRICAL		

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PETAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

1. BUILDING TO THE 5 POOT LINE / AA. ELECTRICAL

TIME 10:07:38

DETAIL PAGE

BASE BII

							PYZE BIT
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	KANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT S
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN IMC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF	0.14	4.07 407	0.02	1.70 170		5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF		591.69 178	2.65 1	825.93 248		1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA			0.00			14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277.

TAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 10:07:38

DETAIL PAGE 2

	1. Dollaring 10	THE 5 TOOT BINE / DA.						BASE BID
DIVISION 15 MECHAN	ICAL	QUANTITY UON CREW	nanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
15050 BASIC MATER 15061 2300 BLAC	IALS AND METHODS K PIPE (ASTM A-53) AND FITTIM	īGS						
CD=4 HV 2302 3 WC=0800	IN (80MM) P.E. SCH 40	*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19	8.79 879
CD=4 HV 2305 6 WC=0800	IN (150MM) P.E. SCH 40	*** UNIT COSTS: *** 100.00 LF MSPFE			0.34 34			
15061 2320 90	DEGREE LR WELD ELL STD. WT.							
CD=4 HV 2323 6 WC=0800	И	*** UNIT COSTS: *** 16.00 EA HSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36 22	193.85 3,102
15061 2340 TE	E FULL SIZE BUTT WELD STD WT.							
CD=4 HV 2343 6 WC=0800	IN	*** UNIT COSTS: *** 4.00 EA MSPFE	8.70 35	239.51 958	9.14 37	37.50 150	1.88	288.02 1,152
15100 9100 TRIP	LE DUTY VALVES							
CD=3 HV 9101 6" WC=0900	TRIPLE DUTY VALVES	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,334
	FIBERGLASS PIPE COVERING WITE JACKETS NOTE - COST DOES NOT (.92M) FOR EACH FITTING PLUS	INCLUDE FITTINGS - FOR						
CD=4 HV 1011 6 WC=0800	IN DIA. PIPE, 1-1/2 IN THK	*** UNIT COSTS: *** 100.00 LF AASBC	0.11 11	3.30 330	0.04 4	3.17 317	0.16 16	6.67 667
15650 REFRIGERATI 15670 3000	ON NATURAL GAS ENGINE DRIVEN CHI	LLERS						,
	O TON NAT GAS ENGINE INCLUDING ISTING CHILLER DEMOLITION	NG *** UNIT COSTS: *** 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	156800.00 156,800	7840 7,840	172233.69 172,234
15670 5000	PUMPS							
	HP CENTRIFUGAL VERTICAL SPLI SE PUMP	T *** UNIT COSTS: *** 2.00 EA MSPFA	10.00	299.30 599	4.03	3000.00 6,000	150.00 300	3453.33 6,907
TOTAL DIVISION 15	HECHANICAL		472		715			
TOTAL FACILITY BA.	HECHANICAL	,	472		715			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6732-3 3-114

ETAILED ESTINATE

## U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

DETAIL PAGE

1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

BASE BIT

TIME 10:07:38

							DVDE DII
DIVISION 15 MECHANICAL	QUANTITY UON CREW	nanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
			*******	********		T	******
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		541	15,295	717	179,377	8,969	204,359
TOTAL BASE BID		541	15,295	717	179,377	8,969	204,359
TOTAL ADDITIVE		0	0	0	0	0	(
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	179,377	8,969	204,359

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6732-3

ROJECT NOTES

## U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

TIME 10:07:38

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING

ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6732-3 3-116

U.S. ARMY CORPS of ENGINEERS M-CACES

SUMMARY PAGE 2

U.S. ARMY CORPS OF ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

D ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

TIME 10:07:38

BID ITEM 1 BUILDING	TO THE 5 FOOT L	INE							BASE BID
ID FACILITY	α	OST TO PRM	OVERHEAD	HONE OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EX	15,277	10.0%	0.0	7.5% 1,260	2.5 <b>\</b> 452	0.0	18,516	18516.22
BA MECHANICAL	1.00 EA	189,082	10.0% 18,908	0.0	7.5 <b>\</b> 15,599	2.5 <b>\$</b> 5,590	0.0	229,179	229179.31
BID ITEM TOTAL	1.00 EA	204,359	20,436	0	16,860	6,041	0	247,696	247695.53
TOTAL BASE BID		204,359	20,436	0	16,860	6,041	0	247,696	
TOTAL ADDITIVE	·	0	0	0	0	0	0	0	
TOTAL INCL ADD		204,359	20,436	0	16,860	6,041	0	247,696	

CURRENCY in DOLLARS

PROJECT ID: 6732-3

CREW ID: ORL290

OJECT CWE SUMMARY

#### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

TIME 10:07:38

SUMMARY PAGE

ID BID ITEM	QUANTITY UOK	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 Ελ	247,696		247,696	247695.50
TOTAL CURRENT CONTRACT COST	•	247,696	0	247,696	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST		247,696	0	247,696	
Government-Furnished Property		0		0	
SUBTOTAL	•	247,696	0	247,696	
Contingencies	7.0%	17,339	0	17,339	
SUBTOTAL	•	265,034	0	265,034	
SIOH (S&A)	5.5\$	14,577	0	14,577	
CURRENT WORKING ESTIMATE	-	279,611	0	279,611	
Estimated Construction Time	365 Days				

CURRENCY in DOLLARS

PROJECT ID: 6732-3

CREW ID: ORL290

### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

SUMMARY PAGE

TIME 10:07:38

ONTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PH	QUANTITY	UON			EQUIPMENT				* SUBCON W/OH&P	±	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	541	15,295	717	188,346	204,359	100.0		0	204,359
	TOTAL DIRECT				541	15.295	717	188,346	 204,359	100.0			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6732-3

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

SUMMARY PAGE

TIME 10:07:3:

DNTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PM	SUBTOTAL	OVERHE. AMOUNT	_		PROFIT AMOUNT				•		CONTRA PCT	CT ****** UNIT COST
λλ	GENERAL/PRIME		204,359	 20,436	10.0	0.0	 16,860	7.5	2.5	0.0	247,	,696	100.0	247695.5-
	TOTAL OVERHEAD & PROFIT			20,436	10.0		16,860	7.5						

DIVISION SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

TIME 10:07:38

SUMMARY PAGE

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT			***** TOTAL * DIRECT
15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715 3	166,959 12,418	8,348 621	189,082 15,277
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359

### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

SUMMARY PAGE

TIME 10:07:38

YSTEMS SUMMARY

	*************					*=======	**** TOTAL *	
	ID SYSTEM	HANHOURS	LABOR	EQUIPMENT	HATERIAL	SALES TAX	DIRECT	
***	08 PLUMBING 09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	187 285 69	5,183 7,877 2,235	189 526 3	2,129 164,830 12,418	106 8,242 621	7,608 181,474 15,277	
	TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

UIPHENT SUNHARY

## U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3

TIME 10:07:38

SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS			HRLY RATE		**** TOTA HOURS	L **** COST
ECR25 EMI20 EWE10					24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	303 200 214
TOTAL	PROJECT EQUIPMENT HOURS						288	717

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6732-3

BOR SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6732 OPTION 3 TIME 10:07:38

SUMMARY PAGE

							HRLY -	UPB	**** TOTA	L ****	
CRAFT	DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	RATE	RATE	HOURS	COST	
	######################################										
LASBW	ASBESTOS WORKER	20.45	0.0	24.0	5.91	0.00	31.27	24.86	11	330	
LELEC	ELECTRICIANS	20.50	0.0	24.0	7.49	0.00	32.91	25.79	69	2,235	
	LABORER/HELPER	17.25	0.0	24.0	3.07	0.00	24.46	18.52	62	1,505	
	EQ OPER, MEDIUM	21.40	0.0	24.01	6.20	0.00	32.74	21.87	12	403	
	STEAM/PIPEFITTERS	20.95	0.0%	24.0%	3.85	0.00	29.83	26.12	387	10,821	
TOTAL !	PROJECT MANHOURS								541	15,295	

* * * END OF SUHMARY REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6732-3 3-124

CREW ID: ORL290

FORT	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY  STAUGUST 1993	MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	SAVINGS OF	PORTUNITY EFFICIENCY UNI	Y SURVEY
LOCATION: BLDG 6910 TYPE/SIZE: Carrier Singl MODEL/SERIAL NUMBER PUMPS: Two 15 HP Chil PAGE 1 OF 5	LOCATION: BLDG 6910 TYPE/SIZE: Carrier Single Stage Aborption Chiller/305 Tons MODEL/SERIAL NUMBER: 16.B032—604/741407338 PUMPS: Two 15 HP Chilled Water, Two 15 HP Condenser Water	ii .			
ABSORPTION CHIL	ABSORPTION CHILLER ENERGY BASELINE	111			ANNUAL
	COOLING	FULL	*HIL	CHILLER	CONSUMPTION
BIN 100/104	OCCURRENCES 2	8TU/HR 360000	10AD 100	0.31	(MB TU/YH)
95/99	25	3660000	100	0.31	422
90/94	111	3660000	88	0.31	1872
	511	3660000	2 B	0.31	2662
	664	3660000	29	0.31	7504
70/74	999	3660000	52	0.31	7595
62/69	693	3660000	43	0.31	5026
60/64 EE/EO	471	3660000	35	0.31	1513
55/59 50/54	793	366000	25	0.31	83.5
45/49	111	366000	10	0.31	187
40/44	69	3660000	0	0.31	0
ABSORPT CHILLED	ABSORPTION CHILLER BASELINE ENERGY	SELINE ENERGY R WATER PUMP BASELINE ENERGY	IERGY		40002
TOTALB	TOTAL BASELINE ENERGY				40669
ABSORPT CHILLED TOTALB	ABSORPTION CHILLER BASELINE ENERGY COST CHILLED AND CONDENSER WATER PUMP BASEL TOTAL BASELINE ENERGY COST	SELINE ENERGY COST R WATER PUMP BASELINE ENERGY COST COST	IERGY COST		160007 7836 167843
ENERGY CONSUMPTION	ISUMPTION	40669 MBTU	v	COST	\$167,843

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY  ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 81 AUGUST 1988	NVINGS O	PPORTUNI H EFFICIENCY UN	TY SURVEY
LOCATION: BLDG 6910 TYPE/SIZE: New Natural Gas Engine Driven Chiller/305 Tons PUMPS: Two 15 HP Chilled Water, Two 10 HP Condenser Water	Chiller/305 Tons			
PAGE 4 OF 5				
OPTION C: NEW NEW NATURAL GAS EN	GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	ENERGY CONSUMP	TION	
COOLING	FULL	*		ANNUAL
	LOAD	FULL	CHILLER	CONSUMPTION
BIN OCCURRENCES	<u>BTU/HR</u>	TOVD	COP	(MBTU/YR)
95/00	0000996	3 3	2	* ;
	365000	3 2	,	or *0c
	366000	8	1.82	50 <del>0</del>
80/84 511	3860000	80	1.85	609
	3660000	67	1.75	830
	3660000	52	1.87	186
	3660000	43	1.65	199
	3660000	35	1.56	387
55/59 289	3660000	30	1.5	219
181	0000996	27	1.45	124
	\$66000	2 0	%:1 0	S 0
NEW NATURAL GAS ENGINE DE	GINE DRIVEN CHILLER ENERGY			5003
CHILLED AND CONDENSER WATER PUMP ENERGY TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLI	ISER WATER PUMP ENERGY GAS ENGINE DRIVEN CHILLER BYBTEM ENERGY	YBTEM ENERGY		556 5560
NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST	RIVEN CHILLER ENERGY	COST		20014
CHILLED AND CONDENSER WATER PUMP ENERGY COST TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYS	NSEH WATER PUMP ENERGY COST GAB ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	st Ystem energy CC	)ST	6530
ENERGY CONSUMPTION	5560 MBTU	<i>n</i> .	COST	\$26,544
NET ENEBOY SAVINGS	95440 NBH!		MET DOLLAB CAVIALOR	
	OI I CO		I DOLLAR SAVING	S \$141,300

CREW ID: ORL290

TTLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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Release 4.20

ABLE OF CONTENTS

## U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

CONTENTS PAGE

SUMMARY PAGE SUNNARY REPORTS PROJECT NOTES...... BID ITEM AND FACILITY SUMMARY......2 CONTRACTOR DIRECT SUMMARY.....4 CONTRACTOR INDIRECT SUNNARY......5 CSI DIVISION SUMMARY......6 EOUIPHENT SUNNARY......8 LABOR SUMMARY.....9 DETAILED ESTIMATE DETAIL PAGE 1. BUILDING TO THE 5 FOOT LINE AA. ELECTRICAL.....1 

* * * END TABLE OF CONTENTS * * *

ETAILED ESTIMATE

# U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3 1. BUILDING TO THE 5 POOT LINE / AA. ELECTRICAL

DETAIL PAGE

TIME 10:35:01

I I I ON 3

BASE BIL

DIVISION 16 ELECTRICAL	QUANTITY UON CREW	KANER	LABOR	EQUIPMENT	MATERIAL	SALESTY	DIRECT S
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS	POSED CONDITION. UNED TO BE FIELD BENT						
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07	0.02	1.70 170		5.8t 58t
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 NLF EELEF			2.65 1	825.93 248	41.30 12	1461.5T 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA		1650.50 1,651		12000.00 12,000		14250.50 14,251
OTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,27

TAILED ESTIMATE

### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

DETAIL PAGE 2

TIME 10:35:01

BASE BID

							BASE BII
DIVISION 15 MECHANICAL	QUANTITY UON CREW	nanhr	Labor	EQUIPHENT	MATERIAL	SALESTX	DIRECT S
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND FITTING	GS.						
CD=4 HV 2302 3 IN (80NH) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19 19	8.79 879
CD=4 HV 2305 6 IN (150MH) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE		8.89 889	0.34 34	8.44 844	0.42 42	18.09
15061 2320 90 DEGREE LR WELD ELL STD. WT.							
CD=4 HV 2323 6 IN WC=0800	*** UNIT COSTS: *** 16.00 EA MSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36 22	193.85
15061 2340 TEE FULL SIZE BUTT WELD STD WT.							
CD=4 HV 2343 6 IN WC=0800	*** UNIT COSTS: *** 4.00 EA MSPFE						
15100 9100 TRIPLE DUTY VALVES							
CD=3 HV 9101 6" TRIPLE DUTY VALVES WC=0900	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,33
15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WITH JACKETS NOTE - COST DOES NOT I (.92H) FOR EACH FITTING PLUS 4	INCLUDE FITTINGS - FOR						
CD=4 HV 1011 6 IN DIA. PIPE, 1-1/2 IN TEK WC=0800	*** UNIT COSTS: *** 100.00 LF AASBC	0.11	3.30 330	0.04	3.17 317	0.16 16	6.6°
.5650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN CHIL	LLERS						
CD=3 HV 3001 320 TON NAT GAS ENGINE INCLUDING EXISTING CHILLER DEMOLITION	S *** UNIT COSTS: *** 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	156800.00 156,800	7840 7,840	172233.69 172,234
15670 5000 PUNPS							
CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL SPLIT WC=0900 CASE PUMP	T *** UNIT COSTS: *** 2.00 EA MSPFA		299.30 599			150.00 300	3453.33 6,907
POTAL DIVISION 15 MECHANICAL		472	13,060	715	166,959	8,348	189,082
TOTAL FACILITY BA. NECHANICAL	r	472	13,060	715	166,959	8,348	189,082

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-3 3-130

ETAILED ESTINATE

### U.S. ARMY CORPS of ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

1. BUILDING TO THE 5 FOOT LINE / BA. NECHANICAL

DETAIL PAGE

TIME 10:35:01

BASE BIL

							DVDT DII
DIVISION 15 MECHANICAL	QUANTITY UON CREW	Hanhr	LABOR	EQUIPMENT	MATERIAL	Salesta	DIRECT S
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		541	15,295	717	179,377	8,969	204,359
TOTAL BASE BID		541	15,295	717	179,377	8,969	204,35
TOTAL DADE DED							
TOTAL ADDITIVE		0	. 0	0	0	0	(
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	179,377	8,969	204,359

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-0 3-131

ROJECT NOTES

## U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

PROJECT ID: 6910-3 3-132

CURRENCY in DOLLARS

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

ID ITEM AND FACILITY SUMMARY

ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

SUNDARY PAGE

TIME 10:35:01

BII	ITEM 1 BUILDING TO	O THE 5 FOOT L	INE							BASE BII
ID	FACILITY	α	OST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTRICAL	1.00 EA	15,277	10.0%	0.0	7.5 <b>\</b> 1,260	2.5 <b>1</b> 452	0.0	18,516	18516.22
Вλ	MECHANICAL	1.00 EA	189,082	10.0%	0.0	7.5 <b>1</b> 15,599	2.5 <b>\</b> 5,590	0.0	229,179	229179.31
BII	) ITEM TOTAL	1.00 EX	204,359	20,436	0	16,860	6,041	0	247,696	247695.53
TOI	TAL BASE BID	•	204,359	20,436	0	16,860	6,041	0	247,696	
101	TAL ADDITIVE		0	0	0	0	0	0	0	
TOT	TAL INCL ADD		204,359	20,436	0	16,860	6,041	0	247,696	

PROJECT CWE SUMMARY

### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

SUMMARY PAGE

 ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	247,696		247,696	247695.50
TOTAL CURRENT CONTRACT COST		247,696	0	247,696	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0	0	0	0	
ESCALATED CONTRACT COST	-	247,696	0	247,696	
Government-Purnished Property		0		0	
SUBTOTAL	-	247,696	0	247,696	
Contingencies	7.0%	17,339	0	17,339	
SUBTOTAL	•	265,034	0	265,034	
SIOH (S&A)	5.5%	14,577	0	14,577	
CURRENT WORKING ESTIMATE	•	279,611	0	279,611	
Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-3 3-134

## U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

SUMMARY PAGE

TIME 10:35:0.

CONTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PH	QUANTITY	DOM	NANERS			HAT W/TX			* SUBCON W/OHEP		SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	541	15,295	717	188,346	204,359	100.0		0	204,355
	TOTAL DIRECT				541	15,295	717	188,346	204,359	100.0			

CREW ID: ORL290 CURRENCY in DOLLARS

PROJECT ID: 6910-3 3-135

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3 TIME 10:35:01

SUNDARY PAGE

TRACTOR	INDIRECT	SUMMARY

ID	CONTRACTOR	PM	SUBTOTAL	OVERHE AMOUNT			PROFIT AMOUNT							CT ******* UNIT COST
λλ	GENERAL/PRIME		204,359	20,436	10.0	0.0	 16,860	7.58	2.5	0.0	24	7,696	100.0	247695.54
	TOTAL OVERHEAD & PROFIT			 20,436	10.0		16,860	7.5%						*

PROJECT ID: 6910-3 3-136

### U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

SUNNARY PAGE 6

TIME 10:35:01

SI DIVISION SUMMARY

ID CSI DIVISION	KANHOURS	LABOR	EQUIPHENT	NATERIAL	SALES TAX	**** TOTAL * DIRECT
15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715 3	166,959 12,418	8,348 621	189,082 15,277
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-3 3-137

STERS SURMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

SUMMARY PAGE

						**** TOTAL *	ł
ID SYSTEM	HANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT	
08 PLUMBING 09 HEATING, VENTILATION & AIR COND 11 INTERIOR ELECTRICAL	187 IT 285 69	5,183 7,877 2,235	189 526 3	2,129 164,830 12,418	106 8,242 621	7,608 181,474 15,277	
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

QUIPHENT SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH		HRLY RATE		**** TO	TAL **** COST
ENI 20	CRANE, 22 TON, HYDRAULIC, SP ( SMALL TOOLS WELDING MACHINE, ELEC, 300 AMP					24.63 1.40 1.62	24.63 1.40 1.62	25 286 264	606 401 428
TOTAL	PROJECT EQUIPMENT HOURS							575	1,435

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-3

ABOR SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6910 OPTION 3

TIME 10:35:01

SUNDIARY PAGE 9

BASE OVERTM TXS/INS FRNG TRVL RATE RATE HOURS CRAFT DESCRIPTION 0.0% 24.0 5.91 0.00 31.27 24.86 21 660 20.45 LASBW ASBESTOS WORKER 20.50 0.0 24.0 7.49 0.00 32.91 25.79 139 4,470 LELEC ELECTRICIANS 3,011 LLABR LABORER/HELPER LOEME EQ OPER, MEDIUM 806 LSPFI STEAM/PIPEFITTERS 21,643 1082 30,590 TOTAL PROJECT MANHOURS

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6910-3

FORT C		MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	SAVINGS OF SILVER WITH HIG	PORTUNITH EFFICIENCY UNI	Y SURVEY
LOCATION: BLDG TYPE/SIZE: Carrier MODEL/SERIAL NUI PUMPS: Two 25 HF PAGE 1 OF 5	LOCATION: BLDG 6921A TYPE/SIZE: Carrier Single Stage Aborption Chiller/570 Tons MODEL/SERIAL NUMBER: 16JB057-604/FCK6921A-83506 PUMPS: Two 25 HP Chilled Water, Two 50 HP Condenser Water	7/570 Tons 21A-83506 Andenser Water			
ABSORPTION CHI	ABSORPTION CHILLER ENERGY BASELINE	0			4
ā	SEASON	FULL	FULL	CHILLER	ENERGY ENSUMPTION
100/104	OCCURRENCES 2	B10/HH 684000	(S)	0.405	(MC10/11K)
95/99	25	6840000	18	0.405	603
90/94	111	684000	88	0.405	2678
60/69 80/84	332 511	5840000	3 <b>2</b>	0.405	2966 2966
75/79	664	6840000	29	0.405	10734
70/74	998	6840000	52	0.405	10865
	693	6840000	43	0.405	7190
55/59	200	Section 1	8 8	50.50 30.50	1180
50/54	187	6840000	25	0.405	887
45/49	111	6840000	10	0.405	268
40/44	69	6840000	0	0	0
ABSOBP	ABSORPTION CHILLER BASELINE ENERGY	NERGY		, , , , , , , , , , , , , , , , , , , ,	57777
CHILED	CHILLED AND CONDENSER WATER	WATER PUMP BASELINE ENERGY	ERGY		1869
TOTALB	TOTAL BASELINE ENERGY				58890
ABSORP	ABSORPTION CHILLER BASELINE ENERGY COST	ENERGY COST			228887
CHILLED	CHILLED AND CONDENSER WATER TOTAL BASELINE ENERGY COST	I WATER PUMP BASELINE ENERGY COST	ERGY COST		19591 248477
ENERGY CONSUMPTION	NSUMPTION	58890 MBTU	n	cosr	\$248,477

Y SURVEY			ANNUAL	(MBTU/YR)	7	980	1128	1739	1844	1235	604	232	<b>8</b>	9351 1112 10463	\$7402 13060 50463	\$50,463	\$198,015
MPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993		MPTION		COP	2	. 2	7A.I	1.75	1.67	1.65	1.5	1.45	1.36 0		COST	COST	NET DOLLAR SAVINGS
SAVINGS ( NICHILLER WITH H SI AUGUST 1993	·	ER ENERGY CONSUL	*	roll LOAD	<del>1</del> 8	100	Q. C.	67	25	43	S	25	0 0	IGY R BYBTEM ENERGY	igy cost cost R system energy	МВТИ	
ENERGY SACE ABSORPTION	ngine Driven Chiller/570 Tons ier, One 50 HP Condenser Water	GINE DRIVEN CHILLE	FULL	LOAU BTU/HR	6840000	6840000	6840000	6840000	6840000	6840000	6840000	8840000	6840000	ENGINE DRIVEN CHILLER ENERGY ENSER WATER PUMP ENERGY IL GAS ENGINE DRIVEN CHILLER S	ENGINE DRIVEN CHILLER ENERGY COST ENSER WATER PUMP ENERGY COST IL GAS ENGINE DRIVEN CHILLER SYSTER	10463	48427 MBTU
2000000	LOCATION: BLDG 6921A TYPE/SIZE: New Natural Gas Engine Driven C PUMPS: Two 25 HP Chilled Water, One 50 HP	PAGE 4 OF 5 OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	COOLING	SEASON OCCURRENCES	2 25	111	352		999	693		50/54	45/49	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CHILLED AND CONDENSER WATER PUMP ENERGY TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST CHILLED AND CONDENSER WATER PUMP ENERGY COST TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	ENERGY CONSUMPTION	NET ENERGY SAVINGS
FORT CA	LOCATION: BI TYPE/SIZE: Ne PUMPS: Two 2	PAGE 4 OF 5 OPTION C: NE		BIN	100/104 95/99		62/63			65/69		50/54	45/49	NEW CHIL	NEW CHIL	ENERGY	NET E

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith \(\lambda\). Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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PROJECT ID: 6921-3 3-143

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ETAILED ESTINATE

### U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

DETAIL PAGE

TIME 13:25:21

ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BIL

							DV2F DT
DIVISION 16 ELECTRICAL	QUANTITY DON CREW	HANER	LABOR	EQUIPHENT	MATERIAL	SALESTX	DIRECT S
16050 BASIC MATERIALS AND METHODS 16111 5100 IMC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170		5. <b>8</b> 8 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF				825.93 248		1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA						
NOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

TAILED ESTINATE

### U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

DETAIL PAGE 2

TIME 13:25:22

1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL BICE BID

							BASE BID
DIVISION 15 MECHANICAL Q	UANTITY DOM CREW	MANER	Labor	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND FITTINGS							
CD=4 HV 2302 3 IN (80HH) P.E. SCH 40 *** WC=0800	* UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19 19	8.79 879
CD=4 HV 2306 8 IN (200MM) P.E. SCH 40 *** WC=0800	* UNIT COSTS: *** 100.00 LF MSPFH	0.40	10.55 1,055	0.69 69	13.19 1,319	0.66 66	25.09 2, <b>5</b> 09
15061 2320 90 DEGREE LR WELD ELL STD. WT.							
CD=4 HV 2324 8 IN *** WC=0800	* UNIT COSTS: *** 16.00 EA MSPFH	8.13 130	214.34 3,429	13.99 224	50.71 811	2.54 41	281.58 4,505
15061 2340 TEE FULL SIZE BUTT WELD STD WT.							
CD=4 HV 2344 8 IN *** WC=0800	* UNIT COSTS: *** 4.00 EA MSPFE	12.38 50	326.61 1,306	21.32 85	69.45 278	3.47 14	420.86 1,683
15100 9100 TRIPLE DUTY VALVES							
CD=3 HV 9102 8" TRIPLE DUTY VALVE ***: WC=0900	* UNIT COSTS: *** 2.00 EA MSPFA	4.00	119.72 239	1.61	1308.00 2,616	65.40 131	1494.73 2,989
15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WITH FIRE JACKETS NOTE - COST DOES NOT INCL. (.92M) FOR EACH FITTING PLUS 4 LF	UDE FITTINGS - POR						
CD=4 HV 1012 8 IN DIA. PIPE, 2 IN THK	* UNIT COSTS: *** 100.00 LF AASBC	0.13	4.18 418	0.05 5	5.99 599	0.30 30	10.52 1,052
15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN CHILLERS	s						
CD=3 HV 3006 570 TON NAT GAS ENGINE INCLUDING *** WC=0900 EXISTING CHILLER DEMOLITION	* UNIT COSTS: *** 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	279300.00 279,300		
15670 5000 PUMPS							
CD=3 HV 5002 15 HP CENTRIFUGAL VERTICAL SPLIT *** WC=0900 CASE PUMP	* UNIT COSTS: *** 2.00 EA MSPFA	10.00	299.30 599	4.03		300.00 600	6603.33 13,207
TOTAL DIVISION 15 MECHANICAL		536	14,585	927	297,306	14,865	327,684
TOTAL FACILITY BA. MECHANICAL	i e	536		927			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6921-3 3-146

TAILED ESTIMATE

# U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 13:25:22

DETAIL PAGE 3

BASE BID

							מזם מכעם
DIVISION 15 MECHANICAL	QUANTITY DON CREW	naner	Labor	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
					~~~~~~		
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		605	16,821	929	309,724	15,486	342,960
TOTAL BASE BID		605	16,821	929	309,724	15,486	342,960
TOTAL DADE DED					******		**********
TOTAL ADDITIVE		0	0	0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		605	16,821	929	309,724	15,486	342,960

* * * END OF DETAIL REPORT * * *

PROJECT ID: 6921-3 3-147 Wed 01 Sep 1993
OJECT NOTES

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

TIME 13:25:22

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6921-3

TOTAL INCL ADD

Wed 01 Sep 1993

U.S. ARMY CORPS OF ENGLISHED SEPTIMENT BLDG 6921A OF U.S. ARMY CORPS of ENGINEERS N-CACES

SUMMARY PAGE 2

TIME 13:25:22

D ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

BASE BID BID ITEM 1 BUILDING TO THE 5 FOOT LINE COST TO PRM OVERHEAD HOME OFC PROFIT BOND OTHER FCTR TOTAL COST UNIT COST ID FACILITY 10.0% 0.0% 7.5% 2.5% 0.0% 1.00 EA 15,277 1,528 0 1,260 452 0 AA ELECTRICAL 0 18,516 18516.22 10.0% 0.0% 7.5% 2.5% 0.0% 397,173 397173.02 BA KECHANICAL 1.00 EA 327,684 32,768 0 28,294 10,139 0 415,689 415689.23 1.00 EA 342,960 34,296 BID ITEM TOTAL 0 28,294 10,139 415,689 342,960 34,296 TOTAL BASE BID 0 0 0 0 0 TOTAL ADDITIVE

342,960 34,296 0 28,294 10,139 0 415,689

PROJECT ID: 6921-3 3-149

Wed 01 Sep 1993

ROJECT CWE SUNHARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

TIME 13:25:21

SUMMARY PAGE

*********	ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
	1. BUILDING TO THE 5 FOOT LINE	1.00 EX	415,689		415,689	415689.20
	TOTAL CURRENT CONTRACT COST	•	415,689	0	415,689	
	Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
	ESCALATED CONTRACT COST	•	415,689	0	415,689	
	Government-Furnished Property		0		0	
	SUBTOTAL	-	415,689	0	415,689	
	Contingencies	7.0\$	29,098	0	29,098	
	SUBTOTAL	_	444,787	0	444,787	
	SIOH (S&A)	5.5%	24,463	0	24,463	
	CURRENT WORKING ESTIMATE	-	469,251	0	469,251	
	Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6921-3

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

SUMMARY PAGE

TIME 13:25:22

NTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PH	QUANTITY	DON	KANHRS	LABOR		MAT W/TX	TOTAL DI ANOUNT		SUBCON W/OHEP	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	605	16,821	929	325,210	342,960	100.0%	(0	342,960
	TOTAL DIRECT				605	16,821	929	325,210	342,960	100.0			

PROJECT ID: 6921-3 3-151

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

SUMMARY PAGE

TIME 13:25:22

NTRACTOR INDIRECT SUNNARY

ID	CONTRACTOR	PM SUBTOTAL	• •		_	HOFC:	PROFIT AMOUNT						ACT ******* UNIT COST
λλ	GENERAL/PRIME	342,960	34	,296	10.0	0.0	 28,294	7.5	2.5%	0.0	415,689	100.0%	415689.24
	TOTAL OVERHEAD & PROFIT		34	,296	10.0%		28,294	7.5					

PROJECT ID: 6921-3 3-152

CSI DIVISION SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

TIME 13:25:2

SUMMARY PAGE

ID CSI DIVISION	MANEOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT	
15 HECHANICAL 16 ELECTRICAL	536 69	14,585 2,235	927 3	297,306 12,418	14,865 621	327,684 15,277	
TOTAL DIRECT	605	16,821	929	309,724	15,486	342,960	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6921-3

YSTEMS SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3 TIME 13:25:20

SUMMARY PAGE

						**** TOTAL *	ł
ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT	
O8 PLUMBING O9 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	250 286 69	6,668 7,917 2,235	401 526 3	3,390 293,916 . 12,418	170 14,696 621	10,629 317,055 15,277	
TOTAL DIRECT	605	16,821	929	309,724	15,486	342,960	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6921-3

OUIPHENT SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

TIME 13:25:22

SUNDARY PAGE

EOUIP	DESCRIPTION	LIFE HRS	 VALUE *** OWNRSHP		ADJUSTD OWNRSHP	HRLY RATE			AL **** COST
ECR25	CRANE, 22 TON, HYDRAULIC, SP (34				24.63	24.63	12	303
ENI20	SHALL TOOLS					1.40	1.40	154	215
EWE10						1.62	1.62	68	111
EWE20	WELDING MACHINE, GASOLINE, 200	ХH				4.45	4.45	68	301
TOTAL	PROJECT EQUIPMENT HOURS							302	930

BOR SUHHARY

CREW ID: ORL290

U.S. ARMY CORPS OF ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6921A OPT 3

TIME 13:25:22

SUMMARY PAGE

							- HRLY	UPB	**** TOTAL	****	
CRAF	T DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	rate	RATE	HOURS	COST	

LASB	W ASBESTOS WORKER	20.45	0.0	24.0%			31.27	24.86	13	418	
LELE	C ELECTRICIANS	20.50	0.0	24.0			32.91	25.79	69	2,235	
LLAB	R LABORER/HELPER	17.25	0.0	24.0	3.07	0.00	24.46	18.52	129	3,158	
LOEM		21.40	0.0%	24.0%	6.20	0.00	32.74	21.87	12	403	
	I STEAM/PIPEFITTERS	20.95	0.0\$	24.0%	3.85	0.00	29.83	26.12	381	10,607	
TOTA	L PROJECT MANHOURS								605	16,821	

* * * END OF SUMMARY REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6921-3

FOR	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	- ENERGY SAVINGS OPPORTUNITY SURVEY ACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	SAVINGS OF ON CHILLER WITH HIGH	PORTUNI EFFICIENCY UNI	ry Survey
LOCATION: BLDG 6929 TYPE/SIZE: Carrier Single & MODEL/SERIAL NUMBER: PUMPS: Two 15 HP CHIREC PAGE 1 OF 5	Stage Aborpti 16JB032-60 I Water, Two	on Chiller/320 Tons 4/74047337 15 HP Condenser Water			
ABSORPTION C	ABSORPTION CHILLER ENERGY BASELINE	111			ANNUAL
	COOLING	FULL	* FULL	CHILLER	CONSUMPTION
BIN 100/104	OCCURRENCES	8TU/HR 3840000	10AU	0.31	(MB10/17)
95/99	25	3840000	25	0.31	1004
90/94 85/89	352	3840000	38	0.31	2606
80/84	511	3840000	8	0.91	7234
40.50	664 Rea	3840000	67	0.31	7969
330	693	3840000	\$	0.31	
60/64	60/64	384000	35	0.31	2017
55/59	299	3840000	8	0.31	1587
50/54	197	3840000	25	0.31	872
45/49	-	3840000	10	0.31	86.
40/44	69	3840000	0	0.31	O
Cady	ADSOCIATION CHILLER RASELINE ENERGY	ENEBGY			41969
CHIL	CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY	ER PUMP BASELINE E	NERGY		299
TOTA	TOTAL BASELINE ENERGY				42637
ABSO	ABSORPTION CHILLER BASELINE ENERGY COST	E ENERGY COST			167876
CHILL	CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY COST TOTAL BASELINE ENERGY COST	ER PUMP BASELINE E	NERGY COST		7836 175713
ENERGY C	ENERGY CONSUMPTION	42637 MBTU	עזו	cost	\$175,713

ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993			ANNUAL	CONSUMPTION	(MBTU/YR)	•	87 4	634	849	976	1035	694 404	230	130	91	5249 556 5806	20898 6530 27528	\$27,528	
0 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS			PTION	CHILLER	COP	2	~ ~	1.92	1.85	1.75	1.67	1.65	1.5	1.45	1.36 0		Sost	COST	
ON CHILLER WITH HI			EN ENERGY CONSUM	* 1	LOAD	100	8 5	3 &	08	67	52	43	30	25	10	IGY R BYSTEM ENERGY	ENGINE DRIVEN CHILLER ENERGY COST ENSER WATER PUMP ENERGY COST ALGAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	мвти	
ACE ABSORPTION	igine Driven Chiller/320 Tons er, Two 10 HP Condenser Water		GINE DRIVEN CHILLE	FULL	BTU/HR	3840000	3840000	3840000	3840000	3840000	3840000	3840000	3840000	3840000	3840000 3840000	ENGINE DRIVEN CHILLER ENERGY ENSER WATER PUMP ENERGY ALGAS ENGINE DRIVEN CHILLER SYSTEM ENERGY	ENGINE DRIVEN CHILLER ENERGY COST ENSER WATER PUMP ENERGY COST IL GAS ENGINE DRIVEN CHILLER SYSTEN	5806	-
ECO 4: REPLY	LOCATION: BLDG 6929 TYPE/SIZE: New Natural Gas Engine Driven Chiller/320 Tons PUMPS: Two 15 HP Chilled Water, Two 10 HP Condenser Waler		OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	COOLING	OCCURRENCES	2	25		80/84 511		866	693	299	197	45/49 111 40/44 69	NEW NATURAL GAS ENGINE DR CHILLED AND CONDENSER WA TOTAL NEW NATURAL GAS ENG	NEW NATURAL GAS ENGINE DR CHILLED AND CONDENSER WA TOTAL NEW NATURAL GAS ENG	ENERGY CONSUMPTION	
; ·	LOCATION: BL TYPE/SIZE: Ne PUMPS: Two 1	PAGE 4 OF 5	OPTION C: NE		BIN	100/104	95/99		80/84	75/79	70/74	65/69	55/59	50/54	45/49	NEW CHIL TOTA	NEW CHIL TOT	ENERGY	

ITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

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ETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

DETAIL PAGE 1

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

1. Building 10	THE 5 POOT LINE / AA.	LIDCIRIC	wn				BASE BIL
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	MANER	LABOR	EQUIPMENT	MATERIAL	Salesta	DIRECT \$
16050 BASIC MATERIALS AND METHODS 16111 5100 IMC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS	POSED CONDITION. UNED TO BE FIELD BENT						
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF	0.14	4.07 407	0.02	1.70 170	0.09 9	5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 NLF EELEF				825.93 248	41.30 12	1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA						
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418		15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

ETAILED ESTINATE

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 10:42:38

DETAIL PAGE :

BICE BIL

	·						BASE BII
DIVISION 15 MECHANICAL	QUANTITY UON CREW	MANHR	Labor	EQUIPMENT	MATERIAL	SALESTY	DIRECT S
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND FITT	INGS						
CD=4 HV 2302 3 IN (80MM) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE	0.17 17	4.59 459	0.18 18	3.83 383		8.79 879
CD=4 HV 2305 6 IN (150MM) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE		8.89 889	0.34 34	8.44 844	0.42 42	18.09
15061 2320 90 DEGREE LR WELD ELL STD. WT							
CD=4 HV 2323 6 IN WC=0800	*** UNIT COSTS: *** 16.00 EA MSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36 22	193.85 3,10
15061 2340 TEE FULL SIZE BUTT WELD STD W	T.						
CD=4 HV 2343 6 IN WC=0800	*** UNIT COSTS: *** 4.00 EA MSPFE			9.14 37			288.03 1,153
15100 9100 TRIPLE DUTY VALVES							
CD=3 HV 9101 6" TRIPLE DUTY VALVES WC=0900	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,33
15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WITH JACKETS NOTE - COST DOES NOTE (.92M) FOR EACH FITTING PLUS	T INCLUDE FITTINGS - FOR						
CD=4 HV 1011 6 IN DIA. PIPE, 1-1/2 IN THK WC=0800	*** UNIT COSTS: *** 100.00 LF AASBC		3.30 330	0.04	3.17 317	0.16 16	6.6°
15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN C	HILLERS						
CD=3 HV 3001 320 TON NAT GAS ENGINE INCLUDE WC=0900 EXISTING CHILLER DEMOLITION	ING *** UNIT COSTS: *** 1.00 EA MSPFO	258 258	7078.85 7,079	514.85 515	156800.00 156,800	7840 7,840	172233.69 172,23
15670 5000 PUMPS							
CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL SPI WC=0900 CASE PUMP	LIT *** UNIT COSTS: *** 2.00 EA MSPFA			4.03 8		150.00 300	3453.33 6,907
TOTAL DIVISION 15 MECHANICAL		472	13,060	715	166,959	8,348	189,082
TOTAL FACILITY BA. HECHANICAL	t	472		715			

PROJECT ID: 6929-3 3-162

PETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 10:42:38

DETAIL PAGE

BASE BII

							וות מכשת
DIVISION 15 MECHANICAL	QUANTITY UON CREW	MANHR	Labor	EQUIPMENT	HATERIAL	SALESTX	DIRECT (
			15 205	717	170 277		204 25/
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		541	15,295	717	179,377	8,969	204,359
TOTAL BASE BID		541	15,295	717	179,377	8,969	204,359
TOTAL ADDITIVE		0	0	0	0	9	(
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	179.,377	8,969	204,359

* * * END OF DETAIL REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: 6929-3 3-163

Wed 01 Sep 1993

JECT NOTES

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

PROJECT ID: 6929-3 3-164

CREW ID: ORL290

CURRENCY in DOLLARS

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
D ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

SUMHARY PAGE

TIME 10:42:38

BID ITEM 1 BUILDING	TO THE 5 FOOT L	INE							BASE BID
ID FACILITY	0	OST TO PRM	overhead	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	15,277	10.03	0.0	7.5% 1,260	2.5 \ 452	0.0	18,516	18516.22
BA MECHANICAL	1.00 EA	189,082	10.0% 18,908	0.0	7.5 \ 15,599	2.5 \$ 5,590	0.0	229,179	229179.31
BID ITEM TOTAL	1.00 EA	204,359	20,436	0	16,860	6,041	0	247,696	247695.53
TOTAL BASE BID		204,359	20,436	0	16,860	6,041	0	247,696	
TOTAL ADDITIVE		0	0	0	0	. 0	0	0	
TOTAL INCL ADD		204,359	20,436	0	16,860	6,041	0	247,696	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6929-3

JECT CWE SUNDLARY

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

SUMMARY PAGE 3

QUANTITY DON BASE BID ADDITIVE TOTAL COST UNIT COST ID BID ITEM 247,696 247695.50 1.00 EX 247,696 1. BUILDING TO THE 5 FOOT LINE 247,696 0 247,696 TOTAL CURRENT CONTRACT COST Cost Growth from 08/93 to 08/94 0 0 . 0 0.0% Index Values: 0000 0000 247,696 247,696 0 ESCALATED CONTRACT COST 0 Government-Furnished Property 247,696 0 247,696 SUBTOTAL Contingencies 7.0% 17,339 17,339 265,034 265,034 SUBTOTAL 14,577 SIOH (S&A) 5.5% 14,577 CURRENT WORKING ESTIMATE 279,611 279,611

Estimated Construction Time

365 Days

PROJECT ID: 6929-3 3-166

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

SUMMARY PAGE

TIME 10:42:38

WTRACTOR DIRECT SUNHARY

TOTAL DIRECT

ID	CONTRACTOR	QUANTITY DOM				HAT W/TX			* SUBCON W/OH&P	*SUBTOTAL
λλ	GENERAL/PRIME	1.00 EA	541	15,295	717	188,346	204,359	100.0		0 204,359

541 15,295 717 188,346 204,359 100.0

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6929-3

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

SUMMARY PAGE 5

TIME 10:42:38

NTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PN	SUBTOTAL	OVERHEA AMOUNT							****** TOTA AMOUNT		CT ******* UNIT COST
λλ	GENERAL/PRIME		204,359	 20,436	10.0	0.0	 16,860	7.5	2.5	0.0	247,696	100.0	247695.54
	TOTAL OVERHEAD & PROFIT			 20,436	10.0		16,860	7.5					

PROJECT ID: 6929-3 3-168

CURRENCY in DOLLARS

I DIVISION SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

SUMMARY PAGE

DIRECT

----- **** TOTAL * -----MANHOURS LABOR EQUIPMENT MATERIAL SALES TAX ID CSI DIVISION

472 13,060 715 166,959 8,348 15 NECHANICAL 189,082 3 12,418 621 16 ELECTRICAL 69 2,235 15,277 TOTAL DIRECT 541 15,295 717 179,377 8,969 204,359

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6929-3 3-169

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

SUNNARY PAGE

TIME 10:42:38

YSTEMS SUMMARY

							**** TOTAL *	
	ID SYSTEM	NANHOURS	LABOR	EQUIPHENT	MATERIAL	SALES TAX	DIRECT	

	O8 PLUMBING	187	5,183	189	2,129	106	7,608	
	09 HEATING, VENTILATION & AIR CONDIT	285	7,877	526	164,830	8,242	181,474	
	11 INTERIOR ELECTRICAL	69	2,235	3	12,418	621	15,277	
	TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

CREW ID: ORL290 CURRENCY in DOLLARS

PROJECT ID: 6929-3

UIPHENT SUNHARY

U.S. ARMY CORPS of ENGINEERS M-CACES EMERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH	ADJUSTD OWNRSHP	HRLY RATE		**** TOT?	L **** COST
ENI20	CRANE, 22 TON, HYDRAULIC, SP SMALL TOOLS WELDING MACHINE, ELEC, 300 AM					24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	303 200 214
TOTAL	PROJECT EQUIPMENT HOURS							288	717

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6929-3

LABOR SUMMARY

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6929 OPTION 3

TIME 10:42:38

SUMMARY PAGE

*****						mnin	HRLY			TAL ****	
CRAFT	DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TKVL	RATE	KATE	HOURS	COST	
LASBW	ASBESTOS WORKER	20.45	0.0%	24.0%	5.91	0.00	31.27	24.86	11	330	
	ELECTRICIANS	20.50	0.0	24.0	7.49	0.00	32.91	25.79	69	2,235	
LLABR	LABORER/HELPER	17.25	0.0	24.0%	3.07	0.00	24.46	18.52	62	1,505	
LOENE	EQ OPER, MEDIUM	21.40	0.0	24.0%	6.20	0.00	32.74	21.87	12	403	
	STEAM/PIPEFITTERS	20.95	0.0	24.0	3.85	0.00	29.83	26.12	387	10,821	
	·										
TOTAL	PROJECT HANHOURS								541	15,295	

* * * END OF SUMMARY REPORT * * *

FORT CAMPBELL ECO 4: REPL	MPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	SAVINGS OF	PORTUNI 1 EFFICIENCY UNI	rs SURVEY
LOCATION: BLDG 6936 TYPE/SIZE: Carrier Single Stage Aborption Chiller/180 Tons MODEL/SERIAL NUMBER: 16.B018—604/734307182 PUMPS: One 5 HP Chilled Water, One 10 HP Condenser Water PAGE 1 OF 5	Chiller/180 Tons 54307182 Condenser Water			
ABSORPTION CHILLER ENERGY BASELINE	INE			Z
	FULL	* 77.	CHILLER	CONSUMPTION
100/104 OCCUMPENCES	216000	(A)	0.49	(MB10/11)
	2160000	100	0.49	157
90/94 111 85/89 352	216000	8 8	0.49	1995
	2160000	04	0.49	2574
	2160000	29	0.49	2802
/U//4 65/69 693	216000	52 43	0.49	2852
	2160000	35	0.49	1038
	2160000	S	0.49	565
50/54	2160000	25	0.49	310
-	2160000	10	0.49	70
40/44	216000	O	D	O
ARSORPTION CHILLER HASELINE ENERGY	NE ENEBGY			14035
CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY	ATER PUMP BASELINE E	NERGY		167
TOTAL BASELINE ENERGY				15102
TOO YOUR BIN 139 A G ST IILO NOT GOODA	NE ENEBOY COST			50742
CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY COST	ATER PUMP BASELINE E	NERGY COST		1959
TOTAL BASELINE ENERGY COST	ST			61701
ENERGY CONSUMPTION	15102 MBTU	JT.	cosr	\$61,701

ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS				ENERGY	CONSUMPTION	(MBTU/YR)	2	27	120	356	477	3 C S S S S S S S S S S S S S S S S S S	300	228	129	73	16	0	2054	797	3120	11811	1959	07/81	\$13,770	947.030
ECO 4; REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS			IPTION		CHILLER	COP	2	2		28.1	1.60	1.75		1.56	1.5	1,45	1.36	0					7001	1800	COST	NET DOLLAR SAVINGS
CHILLER WITH HI			er energy consum	×	FULL	LOAD	200	8:	82	S 6	20	62	. F	35	30	25	10	0	lGY		R BYBTEM ENENGY	IGY COST	JENSER WATER PUMP ENERGY COST	N SISIEM ENERGI	МВТИ	
ACE ABSORPTION	ngine Driven Chiller/180 Tons r, One 10 HP Condenser Water		GINE DRIVEN CHILLE	FULL	LOAD	BTU/HR	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	ENGINE DRIVEN CHILLER ENERGY	ENSER WATER PUMP ENERGY	IL GAS ENGINE DRIYEN CHILLER BYBTEM ENERGY	ENGINE DRIVEN CHILLER ENERGY COST	LENSER WATER PUMP ENERGY COST		3120	THOM SOUTH
ECO 4; REPLA	I Gas Er	·	OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	COOLING	SEASON	OCCURRENCES	2	25			110	200 gr		124	299	161	111	69	NEW NATURAL GAS ENGINE DR		TOTAL NEW NATURAL GAS ENG	NEW NATURAL GAS ENGINE DR	CHILLED AND CONDENSER WAT		ENERGY CONSUMPTION	NET ENEDGY CAMBICS
5	LOCATION: BLDG 6936 TYPE/SIZE: New Natura PUMPS: One 5 HP Chilk	PAGE 4 OF 5	OPTION C: NE			BIN	100/104		#A/\#	80/00	75/79			60/64		20/54	45/49	40/44	WEN	CHIL	TOT	NEW	CHIL		ENERGY	THIN

NITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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AA. ELECTRICAL	
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DETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 14:05:31

DETAIL PAGE

BASE BID

							BYZE RID
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	KANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EX ALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF	0.14	4.07 407	0.02	1.70 170	0.09	5.88 588
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF		591.69 178	2.65	825.93 248	41.30	1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA	50.00 50	1650.50 1,651	0.00	12000.00 12,000		14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

DETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / PT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3
1. BUILDING TO THE 5 POOT LINE / BA. MECHANICAL

TIME 14:05:31

DETAIL PAGE 2

BASE BID

							BASE BID
DIVISION 15 MECHANICAL	QUANTITY UON CREW	MANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND FIT	Tings						
CD=4 HV 2302 3 IN (80MM) P.E. SCE 40 WC=0800	*** UNIT COSTS: *** 100.00 LP MSPFE	0.17 17	4.59 459	0.18 18	3.83 383	0.19 19	8.79 8 79
CD=4 HV 2303 4 IN (100MM) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE		5.92 592	0.23 23	–		11.84
15061 2320 90 DEGREE LR WELD ELL STD. WI							
CD=4 HV 2322 4 IN WC=0800	*** UNIT COSTS: *** 16.00 EA MSPFE	3.50 56	96.47 1,544	3.68 59	11.11 178	0.56	111.82 1,789
15061 2340 TEE FULL SIZE BUTT WELD STD W	T.						
CD=4 HV 2342 4 IN WC=0800	*** UNIT COSTS: *** 4.00 EA MSPFE		144.97 580	5.53 22		1.03 4	
15100 9100 TRIPLE DUTY VALVES							
D=3 HV 9101 6" TRIPLE DUTY VALVES C=0900	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.86 2,334
15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WI JACKETS NOTE - COST DOES NO (.92M) FOR EACH FITTING PLU	T INCLUDE FITTINGS - FOR						
CD=4 HV 1009 4 IN DIA. PIPE, 1 IN THICK WC=0800	*** UNIT COSTS: *** 100.00 LF AASBC			0.03			4.55 455
15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN C	HILLERS						
CD=3 HV 3003 180 TON NAT GAS ENGINE INCLUD EXISTING CHILLER DEMOLITION	ING *** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	88200.00 88,200	4410 4,410	96558.72 96,559
15670 5000 PUMPS							
CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL SP. WC=0900 CASE PUMP	LIT *** UNIT COSTS: *** 2.00 EA MSPFA						3453.33 6,907
OTAL DIVISION 15 MECHANICAL	•	284		403			110,794
OTAL FACILITY BA. MECHANICAL	,	284		403			
						1	

DETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 14:05:31

DETAIL PAGE

							BASE BII
DIVISION 15 NECHANICAL	QUANTITY UON CREW	KANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		354	10,140	405	110,024	5,501	126,071
TOTAL BASE BID		354	10,140	405	110,024		126,071
TOTAL ADDITIVE		0	0	0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		354	10,140	405	110,024	5,501	126,071

* * * END OF DETAIL REPORT * * *

PROJECT NOTES

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / PT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

TIME 14:05:3

SUMMARY PAGE

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6936-3

U.S. ARMY CORPS of ENGINEERS H-CACES

TIME 14:05:31

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ID ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

BII	ITEM 1 BUILDING	ro the 5 foot 1	INE							BASE BIT
ID	FACILITY	(COST TO PRN	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTRICAL	1.00 EA	15,277	10.0 \ 1,528	0.0	7.5 \ 1,260	2.5 t 452	0.0	18,516	18516.22
BA	NECHANICAL	1.00 EX	110,794	10.0% 11,079	0.0	7.5 t 9,141	2.5 \ 3,275	0.0	134,289	134289.34
BII	ITEM TOTAL	1.00 EA	126,071	12,607	0	10,401	3,727	0	152,806	152805.56
TOI	AL BASE BID		126,071	12,607	0	10,401	3,727	0	152,806	
TOT	AL ADDITIVE		0	0	0	0	0	0	0	
TOI	AL INCL ADD		126,071	12,607	0	10,401	3,727	0	152,806	

PROJECT ID: 6936-3 3-181

OJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

TIME 14:05:31

SUMMARY PAGE

ID BID ITEM	QUANTITY DON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EX	152,806		152,806	152805.60
TOTAL CURRENT CONTRACT COST	•	152,806	0	152,806	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.01	0	0	0	
ESCALATED CONTRACT COST	•	152,806	0	152,806	
Government-Furnished Property		0		0	
SUBTOTAL	-	152,806	0	152,806	
Contingencies	7.0%	10,696	0	10,696	
SUBTOTAL	-	163,502	0	163,502	
SIOH (S&A)	5.5	8,993	0	8,993	
CURRENT WORKING ESTIMATE	-	172,495	0	172,495	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6936-3

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

TIME 14:05:3.

CONTRACTOR DIRECT SUNHARY

ID	CONTRACTOR	PN	QUANTITY	DON	MANHRS	LABOR	EQUIPMENT	HAT W/TX	* TOTAL DI	RECT *	* SUBCON W/OR&P	t	SUBTOTAL
λλ	GENERAL/PRINE		1.00	Ελ	354	10,140	405	115,525	126,071	100.0		0	126,071
	TOTAL DIRECT				354	10,140	405	115,525	126,071	100.0			

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: 6936-3

U.S. ARMY CORPS of ENGINEERS H-CACES ENERGY SAVINGS OPPORTUNITY SURVY / PT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

TIME 14:05:31

PONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PM	SUBTOTAL	***	OVERHE.	AD *** PCT	HOFC:	PROFIT AMOUNT				TOTAI OUNT		CT ************************************
	GENERAL/PRIME TOTAL OVERHEAD & PROFIT		126,071		12,607			 10,401	 2.5%	0.0\$	152	2,806	100.0	152805.55

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

TIME 14:05:3

GI DIVISION SUMMARY

 ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	HATERIAL	SALES TAX	***** TOTAL * DIRECT	
15 MECHANICAL 16 ELECTRICAL	284 69	7,905 2,235	403 3	97,606 12,418	4,880 621	110,794 15,277	
TOTAL DIRECT	354	10,140	405	110,024	5,501	126,071	

STEKS SUNMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

TIME 14:05:31

SUMMARY PAGE

							***** TOTAL *
ID S	SYSTEM	HANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT
09 I	PLUMBING HEATING, VENTILATION & AIR CONDIT INTERIOR ELECTRICAL	123 161 69	3,426 4,479 2,235	124 278 3	1,376 96,230 12,418	69 4,812 621	4,995 105,799 15,277
TOTA	AL DIRECT	354	10,140	405	110,024	5,501	126,071

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

TIME 14:05:31

QUIPHENT SUNHARY

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH	BOOK OP - EXPENSE	HRLY RATE		**** TOTA	L **** COST
		•				24.63 1.40 1.62	24.63 1.40 1.62	6 87 78	158 121 127
	PROJECT EQUIPMENT HOURS							171	405

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6936 OPTION 3

SUMMARY PAGE

TIME 14:05:31

BOR SUMMARY

_								- HRLY	UPB	**** TOTAL	, ****	
_	CRAPT	DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL	RATE	RATE	HOURS	COST	
	LASBW	ASBESTOS WORKER	20.45	0.0%	24.03	5.91	0.00	31.27	24.86	8	251	
	LELEC	ELECTRICIANS	20.50	0.0%	24.0	7.49	0.00	32.91	25.79	69	2,235	
	LLABR	LABORER/HELPER	17.25	0.0	24.0	3.07	0.00	24.46	18.52	32	783	
	LOENE	EQ OPER, MEDIUN	21.40	0.0	24.0	6.20	0.00	32.74	21.87	6	210	
	LSPFI	STEAM/PIPEFITTERS	20.95	0.0	24.0	3.85	0.00	29.83	26.12	238	6,662	
	TOTAL	PROJECT HANHOURS								354]	10,140	

* * * END OF SUMMARY REPORT * * *

Y SURVEY		ANNUAL	CONSUMPTION (MBTU/YR)	38 	442 1964	9095	7234	7873	5273	7182	1587	872	8.	0	41969	667 42637	16/8/6	175719	\$175,719
MPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS			CHILLER	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31					cost
AVINGS OF HILLER WITH HIG		;	FULL LOAD	100	8 2	86	90	67 52	43	38 38	8	25	9	O		ENERGY	ENERGY COST		МВТИ
ENERGY S.	ller/320 Tons 7336 Condenser Water		FULL LOAD BTU/HR	3840000	3840000	3840000	3840000	3840000	384000	384000	3840000	3840000	3840000	3840000	ENERGY	ER PUMP BASELINE F	R BASELINE ENERGY COST NSFR WATER PUMP BASELINE B		42637 MI
CAMPBELL ECO 4: REPLA	e :: e	ABSORPTION CHILLER ENERGY BASELINE	COOLING SEASON OCCURRENCES	2	25 111		511	664	88	471		197	_	69	ABSORPTION CHILLER BASELINE ENERGY	CHILLED AND CONDENSER WATER PUMP BASELINE ENERGY TOTAL BASELINE ENERGY	ABSORPTION CHILLER BASELINE ENERGY COST CHILLED AND CONDENSER WATER PLIMP BASELINE ENERGY COST	TOTAL BASELINE ENERGY COST	SUMFTION
FORT CAMPI	LOCATION: BLDG 6938 TYPE/SIZE: Carrier Singl MODEL/SERIAL NUMBER PUMPS: Two 15 HP Chil	ABSORPTION CHILL	BIN	100/104	95/99		80/84	75/79	65/69	200		50/54	45/49	40/44	ABSORPTI	CHILLED A	ABSORPTI CHILLED A	TOTALBA	ENERGY CONSUME TION

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO. 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993	ELL ENEF	31 AUGUST	NGS OPF R WITH HIGHE 1993	MPBELL ENERGY SAVINGS OPPORTUNITY ECO. 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS	Y SURVEY
LOCATION: BLDG 6938 TYPE/SIZE: New Natural Gas Engine Driven Chiller/320 Tons PUMPS: Two 15 HP Chilled Water, Two 10 HP Condenser Water	Driven Chiller/320 Tc	xis Water			
PAGE 4 OF 5					
OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	AS ENGINE DRIVE	EN CHILLER ENER	SY CONSUMPTIO	~	
COOLING		FULL	Ж		ANNUAL
		LOAD	FULL	CHILLER	CONSUMPTION
BIN OCCURRENCES	71	3840000	<u> </u>	SOP ((MBTU/YR)
95/99		3840000	8	2	48
90/94	111	3840000	901	2	213
85/89		3840000	&	1.92	634
80/84		3840000	80	1.85	849
70/74	664 BAK	3840000 3840000	67 K2	1.75	976
88		3840000	43	1.65	904
60/64		3840000	35	1.56	406
55/59		3840000	တ္တ	1.5	230
50/54	197	3840000	25	1,45	280
45/49	000000000000000000000000000000000000000	3840000	10	1.38	35
40/44	69	3840000	O	0	0
NEW NATURAL GAS ENG	AGINE DRIVEN CHILLER ENERGY	LER ENERGY			5249
CHILLED AND CONDENSER WATER PUMP ENERGY TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILL!	ER WATER PUMP 18 ENGINE DRIVE	ISER WATER PUMP ENERGY GAS ENGINE DRIVEN CHILLER BYBTEM ENERGY	M ENERGY		556
NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST	INE DRIVEN CHIL	LER ENERGY COS	_		20898
CHILLED AND CONDENSER WATER PUMP ENERGY COST TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER SYS	ER WATER PUMP 18 ENGINE DRIVE	IBER WATER PUMP ENERGY COST GAB ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	M ENERGY COST		6530 27528
ENERGY CONSUMPTION		5806 MBTU		cost	\$27,528
NET ENERGY SAVINGS		36831 MBTU	NET D	NET DOLLAR SAVINGS	\$148,185
				-	

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith \(\lambda\). Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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> PROJECT ID: 6938-3 3-191

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U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:53

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* * * END TABLE OF CONTENTS * * *

BA. MECHANICAL.....2

TAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

DETAIL PAGE 1

TIME 13:50:53

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

DIVISION 16 ELECTRICAL	QUANTITY UON CREW	HANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT (
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EXI ALL 1/2 IN AND 3/4 IN ELBOWS ASSI							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF		4.07 407	0.02	1.70 170	0.09 9	5.8 58
16120 1700 600 VOLT FEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF			2.65	825.93 248		1461.5°
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA		1650.50 1,651		12000.00		14250.56 14,25
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,27
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,27

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

DETAIL PAGE :

DETAILED ESTIMATE ECO-4: CHILLER REPLACEMENT BLDG 6938 OF 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

BASE BIL

TIME 13:50:5

							BASE BI
DIVISION 15 MECHANICAL	QUANTITY UON CREW			EQUIPMENT			
15050 BASIC MATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTM A-53) AND FITTING	as						
CD=4 HV 2302 3 IN (80MH) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE		4.59 459	0.18 18	3.83 383	0.19 19	8.7 87
CD=4 HV 2305 6 IN (150MM) P.E. SCH 40 WC=0800	*** UNIT COSTS: *** 100.00 LF MSPFE	0.32	8.89 889	0.34 34	8.44 844	0.42 42	
15061 2320 90 DEGREE LR WELD ELL STD. WT.							
CD=4 HV 2323 6 IN WC=0800	*** UNIT COSTS: *** 16.00 EA MSPFE	5.78 92	159.21 2,547	6.08 97	27.20 435	1.36 22	193.89 3,10
15061 2340 TEE FULL SIZE BUTT WELD STD WT.							
CD=4 HV 2343 6 IN WC=0800	*** UNIT COSTS: *** 4.00 EA MSPFE	8.70 35	239.51 958	9.14 37	37.50 150	1.88	288.0 1,15
15100 9100 TRIPLE DUTY VALVES							
CD=3 HV 9101 6" TRIPLE DUTY VALVES WC=0900	*** UNIT COSTS: *** 2.00 EA MSPFA	3.33 7	99.77 200	1.34	1015.00 2,030	50.75 102	1166.8 2,33
15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WITH JACKETS NOTE - COST DOES NOT I (.92M) FOR EACH FITTING PLUS 4	NCLUDE FITTINGS - FOR						
CD=4 HV 1011 6 IN DIA. PIPE, 1-1/2 IN THK WC=0800	*** UNIT COSTS: *** 100.00 LF AASBC	0.11	3.30 330	0.04 4	3.17 317	0.16 16	6.6 66
15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN CHIL	LERS						
CD=3 HV 3001 320 TON NAT GAS ENGINE INCLUDING EXISTING CHILLER DEMOLITION					156800.00 156,800		
15670 5000 PUMPS							
CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL SPLIT WC=0900 CASE PUMP	**** UNIT COSTS: *** 2.00 EA MSPFA			4.03 8	3000.00 6,000	150.00 300	3453.3 6,90
TOTAL DIVISION 15 MECHANICAL		472	13,060	715	166,959	8,348	189,08

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3

ETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 13:50:53

DETAIL PAGE 3

BASE BID

							DADE DIE
DIVISION 15 MECHANICAL	QUANTITY UON CREW	nanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$

TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		541	15,295	717	179,377	8,969	204,359
TOTAL BASE BID		541	15,295	717	179,377	8,969	204,359
TOTAL ADDITIVE		0	0	0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	179,377	8,969	204,359

* * * END OF DETAIL REPORT * * *

PROJECT ID: 6938-3 3-195

CREW ID: ORL290

CURRENCY in DOLLARS

RROJECT NOTES

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:51

SUMMARY PAGE

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING ABSORPTION CHILLERS IN SELECTED FACILITIES.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3 3-196

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
SID ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

SUMMARY PAGE

TIME 13:50:5

BII	ITEN 1 B	UILDING TO THE 5 FOOT	LINE							BASE BI
ID	FACILITY		COST TO PRM	OVERHEAD	HONE OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COS
λλ	ELECTRICAL	1.00 EA	15,277	10.0 % 1,528	0.0	7.5 \ 1,260	2.5 % 452	0.0%	18,516	18516.2
Вλ	NECHANICAL	1.00 EA	189,082	10.01	0.0	7.5 \ 15,599	2.5 \$ 5,590	0.0\$	229,179	229179.3.
BI	TEN TOTAL	1.00 EA	204,359	20,436	0	16,860	6,041	0	247,696	247695.5
10	TAL BASE BID		204,359	20,436	0	16,860	6,041	0	247,696	
TO	TAL ADDITIVE		0	0	0	0	0	0	0	
TO:	TAL INCL ADD		204,359	20,436	0	16,860	6,041	0	247,696	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3 3-197

PROJECT CWE SUNHARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:5.

SUMMARY PAGE

ID BID ITEM	NOU YTITHAUQ	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	247,696		247,696	247695.50
TOTAL CURRENT CONTRACT COST	•	247,696	0	247,696	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST		247,696	0	247,696	
Government-Furnished Property		0		0	
SUBTOTAL		247,696	0	247,696	
Contingencies	7.0%	17,339	0	17,339	
SUBTOTAL	•	265,034	0	265,034	
SIOH (S&A)	5.5%	14,577	0	14,577	
CURRENT WORKING ESTIMATE	-	279,611	0	279,611	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3 3-198

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:53 SUNDARY PAGE 4

INTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PN	QUANTITY	UON	nanhrs		EQUIPMENT	** HAT W/TX			W/OH&P	±	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	541	15,295	717	188,346	204,359	100.0		0	204,359
	TOTAL DIRECT				541	15,295	717	188,346	204,359	100.0			

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:53

SUMMARY PAGE 5

NTRACTOR	INDIRECT	SUMMARY
----------	----------	---------

ID	CONTRACTOR	PN SUBTY		* OVERHEA AMOUNT	_		PROFIT AMOUNT				ATOT ******		CT ******* UNIT COST
λλ	GENERAL/PRIME	204	359	20,436	10.0	0.0	 16,860	7.5	2.5	0.0\$	247,696	100.0\$	247695.54
	TOTAL OVERHEAD & PROFIT			20,436	10.0		 16,860	7.5					

SI DIVISION SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3 TIME 13:50:51

SUMMARY PAGE

						**** TOTAL *	
ID CSI DIVISION	HANHOURS	LABOR	EQUIPMENT	MATERIAL			
15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715 3	166,959 12,418	8,348 621	189,082 15,277	
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

SYSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3

TIME 13:50:53

SUMMARY PAGE

						**** TOTAL *	
 ID SYSTEM	HANHOURS	LABOR	EQUIPMENT	HATERIAL	SALES TAX	DIRECT	
08 PLUMBING 09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	187 285 69	5,183 7,877 2,235	189 526 3	2,129 164,830 12,418	106 8,242 621	7,608 181,474 15,277	
TOTAL DIRECT	541	15,295	717	179,377	8,969	204,359	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3 3-202

QUIPHENT SUNHARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CEILLER REPLACEMENT BLDG 6938 OPTION 3 TIME 13:50:53

SUMMARY PAGE {

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH	BOOK OP -	HRLY RATE		**** TOTAL HOURS	**** COS1
ENI20	CRANE, 22 TON, HYDRAULIC, SP (SMALL TOOLS WELDING MACHINE, ELEC, 300 AMP					24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	303 200 214
TOTAL	PROJECT EQUIPMENT HOURS							288	717

BOR SUHMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6938 OPTION 3 TIME 13:50:53

SUMMARY PAGE

 							- HRLY	UPB	**** 707	'λ[, ****	
CRAFT	DESCRIPTION	Base	OVERTH	TXS/INS	FRNG	TRVL	RATE		HOURS	COST	
LASBW	ASBESTOS WORKER	20.45	0.0	24.01	5.91	0.00	31.27	24.86	11	330	
LELEC	ELECTRICIANS	20.50	0.0	24.0	7.49	0.00	32.91	25.79	69	2,235	
LLABR	LABORER/HELPER	17.25	0.0	24.0	3.07	0.00	24.46	18.52	62	1,505	
LOEKE	EQ OPER, MEDIUM	21.40	0.0	24.0%	6.20	0.00	32.74	21.87	12	403	
LSPFI	STEAM/PIPEFITTERS	20.95	0.0%	24.0	3.85	0.00	29.83	26.12	387	10,821	
	•										
TOTAL	PROJECT MANHOURS								541	15,295	

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6938-3 3-204

ECO 4: REPLACE ABSORBTION CHILLER ECO 4: REPLACE ABSORBTION CHILLER Bie Stage Aborption Chiller/380 Tons EN CABZALZMSCOXO FILE COOLUNG EN ENERGY BASELINE COOLUNG EN ENERGY BASELINE COOLUNG EN ENERGY BASELINE COOLUNG EN ENERGY EN ENERGY BASELINE COOLUNG EN ENERGY EN ENERGY EN ENERGY EN ENERGY EN ENERGY EN ENERGY EN CHILLER BASELINE ENERGY ELINE ENERGY EN CHILLER BASELINE ENERGY ELINE ENERGY COST EN CONDENSER WATER PUMP BASELINE ENERGY ELINE ENERGY COST	GS OPPORTUNITY SURVEY		INTERNA	FULL CHILLER CONSUMPTION LOAD COP (MBTU/FR)	0.405	0.405	100 0,405 1785	0.405	0.405		43 0.405 4793 ac 6.405	0.405	0.405	10 0.405 179 0 0	38148 1001 39149	152591 11754 164346	\$164,346
ECO 4: REPLA ECO 4: REPLA ECO 4: REPLA DG 6944 ne Single Stage Aborption Chill NUMBER: CAB2/L2M5000 5 HP CHILLER ENERGY BASELIN COOLING SEASON OCCURRENCES 25 25 26 322 322 322 322 322 322 322 322 322	ENERGY SAVING CEABSORPTION CHILLER WI	er/380 Tons Condenser Water	ш		4560000	4560000	4560000 4560000	4560000	4560000	4560000	4560000 4560000	456000	4560000	4560000 4560000	E ENERGY ER PUMP BASELINE ENERGY	E ENERGY COST ER PUMP BASELINE ENERGY C	39149 MBTU
FOR LOCATION: BL TYPE/SIZE: Trai MODEL/SERIAL I PUMPS: Two 25 PAGE 1 OF 5 PA	FORT CAMPBELL ECO 4: REPLACE	LOCATION: BLDG 6944 TYPE/SIZE: Trane Single Stage Aborption Chills MODEL/SERIAL NUMBER: C4B2/L2M5000 PUMPS: Two 25 HP Chilled Water, Two 20 HP (PAGE 1 OF 5	ABSORPTION CHILLER ENERGY BASELINE	COOLING SEASON OCCURRENCES				60/64 80/84 511		999	693 474	299	-	251 88	ABSORPTION CHILLER BASELINE CHILLED AND CONDENSER WATE TOTAL BASELINE ENERGY	ABSORPTION CHILLER BASELINE CHILLED AND CONDENSER WATE TOTAL BASELINE ENERGY COST	ENERGY CONSUMPTION

PBELL ENERGY SAVINGS OPPORTUNITY SURVEY O 4: REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993				ENERGY	CONSUMPTION	(MBTU/YR)	٥ [70	752	1006	1159	1230	824	482	273	155	37	0	6234	069	7124	24935	10448	\$35,383	NGS \$128,962
PPORTUN			TION		CHILLER	900 800	2	7	7 67	1.85	1.75	1.67	1.65	1.58	 8.	1.45	1.36	0					овт	cost	NET DOLLAR SAVINGS
PBELL ENERGY SAVINGS OPPORTUNITY OF REPLACE ABSORPTION CHILLER WITH HIGH EFFICIENCY UNITS 31 AUGUST 1993			RENERGY CONSUMP	ж	FULL	TOVD	189	8 2	3 8	90	. 67	52	43	35	80	25	10	0	\.	•	BYSTEM ENERGY	3Y COST	JENSEH WATEH FUMP ENEHGT COST AL GAS ENGINE DRIVEN CHILLER SYSTEM ENERGY COST	мвти	
ENERGY S	ller/380 Tons Sondenser Water		NE DRIVEN CHILLER	FULL	LOAD	BTU/HR	456000	4560000	4560000	4560000	4560000	4560000	4560000	4560000	4560000	4560000	4560000	4560000	ENGINE DRIVEN CHILLER ENERGY	DENSER WATER PUMP ENERGY	NE DRIVEN CHILLER	/EN CHILLER ENERC	DENSEH WATER POMP ENERGY COST IAL GAS ENGINE DRIVEN CHILLER SYS	7124 M	32025 MBTU
FORT CAMPBELL F	LOCATION: BLDG 6944 TYPE/SIZE: New Natural Gas Engine Driven Chiller/380 Tons PUMPS: Two 25 HP Chilled Water, Two 15 HP Condenser Water		OPTION C: NEW NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY CONSUMPTION	COOLING	BEASON	OCCURRENCES -	2	67		511		866	693	171	299	197		69	NEW NATURAL GAS ENGINE DRIV		TOTAL NEW NATURAL GAS ENGINE DRIVEN CHILLER BYSTEM ENERGY	NEW NATURAL GAS ENGINE DRIVEN CHILLER ENERGY COST	TOTAL NEW NATURAL GAS ENGIN	ENERGY CONSUMPTION	NET ENERGY SAVINGS
FOF	LOCATION: B TYPE/SIZE: N PUMPS: Two	PAGE 4 OF 5	OPTION C: N			BIN	100/104	7 0/06			75/79	7074		60/64	55/59	50/54	45/49	40/44	NI N	EES	TOT	NEV	TOT	ENERG	NET E

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY PT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:14

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* * * END TABLE OF CONTENTS * * *

ETAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3
1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 14:30:14

DETAIL PAGE 1

BASE BID

							DYDE DID
DIVISION 16 ELECTRICAL	QUANTITY UON CREW	naner	LABOR	EQUIPMENT	MATERIAL	Salestx	DIRECT \$
16050 BASIC MATERIALS AND METHODS 16111 5100 INC BRANCH AND FEEDER CONDUIT EXALL 1/2 IN AND 3/4 IN ELBOWS ASS							
CD=4 EL 5115 2 IN INC CONDUIT W/COUPLING WC=1100	*** UNIT COSTS: *** 100.00 LF EELEF	0.14	4.07 407	0.02	1.70 170	0.09 9	5.88 588
16120 1700 600 VOLT PEEDER WIRE, SINGLE STR CONDUCTOR, PULLED IN COND	COPPER						
CD=4 EL 1711 NO 2/0 TYPE THWN WC=1100	*** UNIT COSTS: *** 0.30 MLF EELEF						1461.57 438
16900 CONTROLS AND INSTRUMENTATION 16950 2000 CHILLER CONTROLS							
CD=3 EL 2001 CHILLER CONTROL PACKAGE WC=1100	*** UNIT COSTS: *** 1.00 EA EELEA						14250.50 14,251
TOTAL DIVISION 16 ELECTRICAL		69	2,235	3	12,418	621	15,277
TOTAL FACILITY AA. ELECTRICAL		69	2,235	3	12,418	621	15,277

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3 3-209

PETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS N-CACES

ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:14

DETAIL PAGE 2

BASE BID QUANTITY DON CREW MANHR LABOR EQUIPMENT MATERIAL SALESTY DIRECT \$ DIVISION 15 HECHANICAL 15050 BASIC NATERIALS AND METHODS 15061 2300 BLACK PIPE (ASTN A-53) AND FITTINGS 459 *** UNIT COSTS: *** 0.32 8.89 100.00 LF MSPFE 32 889 CD=4 HV 2305 6 IN (150MM) P.E. SCH 40 0.34 8.44 0.42 18.09 34 844 42 WC=0800 1.809 15061 2320 90 DEGREE LR WELD ELL STD. WT. *** UNIT COSTS: *** 5.78 159.21 6.08 CD=4 HV 2323 6 IN 27.20 1.36 193.85 2,547 WC=0800 16.00 EA MSPFE 92 97 435 22 3,102 15061 2340 TEE FULL SIZE BUTT WELD STD WT. *** UNIT COSTS: *** 8.70 CD=4 HV 2343 6 IN 239.51 9.14 37.50 1.88 288-02 150 8 4.00 EA MSPFE 35 958 37 WC=0800 1,152 15100 9100 TRIPLE DUTY VALVES *** UNIT COSTS: *** 3.33 CD=3 HV 9101 6" TRIPLE DUTY VALVES 99.77 1.34 1015.00 50.75 1166.86 2.00 EA MSPFA 7 200 3 2,030 102 WC=0900 2,334 15180 INSULATION 15182 1000 FIBERGLASS PIPE COVERING WITH FIRE RETARDANT JACKETS NOTE - COST DOES NOT INCLUDE FITTINGS - FOR FITTINGS ADD 3 LF (.92M) FOR EACH FITTING PLUS 4 LF (1.2M) FOR EACH FLANGED JOINT *** UNIT COSTS: *** 0.11 3.30 100.00 LF AASBC 11 330 CD=4 HV 1011 6 IN DIA. PIPE, 1-1/2 IN THK 0.04 3.17 0.16 6.67 330 317 16 WC=0800 667 15650 REFRIGERATION 15670 3000 NATURAL GAS ENGINE DRIVEN CHILLERS CD=3 HV 3005 380 TON NAT GAS ENGINE INCLUDING *** UNIT COSTS: *** 258 7078.85 514.85 186200.00 9310 203103.69 WC=0900 EXISTING CHILLER DEMOLITION 1.00 EA MSPPO 258 7,079 515 186,200 9,310 203,104 15670 5000 PUMPS CD=3 HV 5001 10 HP CENTRIFUGAL VERTICAL SPLIT *** UNIT COSTS: *** 10.00 299.30 4.03 3000.00 150.00 3453.33 WC=0900 CASE PUMP 2.00 EA MSPFA 20 599 8 6,000 300 6,907 TOTAL DIVISION 15 MECHANICAL 472 13.060 715 196,359 9,818 219,952 TOTAL FACILITY BA. MECHANICAL 472 13,060 715 196,359 9,818 219.952

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

TAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

TIME 14:30:14

DETAIL PAGE 3

BASE BID

							BASE BID
DIVISION 15 MECHANICAL	QUANTITY UON CREW	hanhr	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
							•
TOTAL BID ITEM 1. BUILDING TO THE 5 POOT LINE		541	15,295	717	208,777	10,439	235,229
TOTAL BASE BID		541	15,295	717	208,777	10,439	235,229
TOTAL ADDITIVE		0	0	0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		541	15,295	717	208,777	10,439	235,229

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

DJECT NOTES

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:14

SUMMARY PAGE 1

PROJECT NOTES

ECO-2: CHILLER REPLACEMENTS

SCOPE OF WORK: EVALUATE 4 DIFFERENT REPLACEMENT OPTIONS FOR EXISTING

ABSORPTION CHILLERS IN SELECTED FACILITIES.

CURRENCY in DOLLARS

PROJECT ID: 6944-3 3-212

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

ED ITEM AND FACILITY SUMMARY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

SUMMARY PAGE

TIME 14:30:14

BID ITEM 1 BUILDING	G TO THE 5 FOOT L	INE							BASE BID
ID FACILITY	C	OST TO PRI	overhead	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	15,277	10.0% 1,528	0.0	7.5 { 1,260	2.5 % 452	0.0%	18,516	18516.22
BA MECHANICAL	1.00 EA	219,952	10.0%	0.0	7.5 1 18,146	2.5% 6,502	0.0%	266,596	266595.68
BID ITEM TOTAL	1.00 EA	235,229	23,523	0	19,406	6,954	0	285,112	285111.90
TOTAL BASE BID		235,229	23,523	0	19,406	6,954	0	285,112	
TOTAL ADDITIVE		0	0	0	0	0	0	0	
TOTAL INCL ADD		235,229	23,523	0	19,406	6,954	0	285,112	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

OJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:14

SUNMARY PAGE 3

ID BID ITEM	NOU YTITHAUQ	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 POOT LINE	1.00 EA	285,112		285,112	285111.90
TOTAL CURRENT CONTRACT COST	•	285,112	0	285,112	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST	•	285,112	0	285,112	
Government-Furnished Property		0		0	
SUBTOTAL	•	285,112	0	285,112	
Contingencies	7.0%	19,958	0	19,958	
SUBTOTAL	•	305,070	0	305,070	
SIOH (S&A)	5.5\$	16,779	0	16,779	
CURRENT WORKING ESTIMATE	-	321,849	0	321,849	

Estimated Construction Time

365 Days

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

SUMMARY PAGE

TIME 14:30:14

ONTRACTOR DIRECT SUMMARY

JANTITY UON MANHRS LABOR EQUIPMENT MAT W/TX AMOUNT PCT W/OH&P SUBTOTAL

ID	CONTRACTOR	PM	QUANTITY	DON				NAT W/TX			W/OH&P	×	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	541	15,295	717	219,216	235,229	100.0		0	235,229
	TOTAL DIRECT				541	15,295	717	219,216	 235,229	100.0			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3 3-215

U.S. ARMY CORPS of ENGINEERS N-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

SUMMARY PAGE !

TIME 14:30:1-

ONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR			OVERHEA AMOUNT	_							****** TOTA AMOUNT		UNIT COST
λλ	GENERAL/PRIME	23	35,229	23,523	10.0	0.0	1	9,406	7.5	2.5	0.0%	285,112	100.0	285111.91
	TOTAL OVERHEAD & PROFIT			23,523	10.0%		1	9,406	7.5					

CURRENCY in DOLLARS

PROJECT ID: 6944-3 3-216

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

SUMPLARY PAGE

TIME 14:30:1

SI DIVISION SUMMARY

 ID CSI DIVISION	NANHOURS	LABOR		NATERIAL		DIRECT
15 MECHANICAL 16 ELECTRICAL	472 69	13,060 2,235	715 3	,	9,818 621	
TOTAL DIRECT	541	15.295	717	208.777	10.439	235,229

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

YSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:14

SUMMARY PAGE 7

	ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	***** TOTAL * DIRECT	
****	08 PLUMBING 09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	187 285 69	5,183 7,877 2,235	189 526 3	2,129 194,230 12,418	106 9,712 621	7,608 212,344 15,277	
	TOTAL DIRECT	541	15,295	717	208,777	10,439	235,229	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3 3-218

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

TIME 14:30:1-SUMMARY PAGE &

EQUIPMENT SUNHARY

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTOR OWNS OVTH		- HRLY RATE		**** TOTAL	L ***
ENI20	CRANE, 22 TON, HYDRAULIC, SP (SMALL TOOLS WELDING MACHINE, ELEC, 300 AM					24.63 1.40 1.62	24.63 1.40 1.62	12 143 132	301 200 214
TOTAL	PROJECT EQUIPMENT HOURS							288	711

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: CHILLER REPLACEMENT BLDG 6944 OPTION 3

SUMMARY PAGE

TIME 14:30:14

ABOR SUHHARY

(CRAFT	DESCRIPTION	Base	OVERTN	TXS/INS	FRNG	TRVL	HRLY RATE		**** TOTAL HOURS	****COST
. I	LELEC LLABR LOKKE LSPFI	EQ OPER, MEDIUM	20.45 20.50 17.25 21.40 20.95	0.0% 0.0% 0.0% 0.0%	24.0% 24.0% 24.0% 24.0%	7.49 3.07 6.20	0.00 0.00 0.00	31.27 32.91 24.46 32.74 29.83	24.86 25.79 18.52 21.87 26.12	62 12 387 1	330 2,235 1,505 403 0,821

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 6944-3

TITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY
ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

Contract No: 27-93-C-0096

Prepared By: Systems Corp Estimator: Keith λ. Derrington Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: CTEO40

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

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ETAILED ESTIMATE

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS 1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 09:11:15

DETAIL PAGE 1

BASE BID

								BYZE BID
DIVISION 16 ELE	CTRICAL	QUANTITY UON CREW	MANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
	AND INSTRUMENTATION O VARIABLE SPEED DRIVES							
CD=3 EL 1005 WC=1100	140 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 1.00 EA EELEB	20.00	660.20 660	2.58	6000.00 6,000	300.00	6962.78 6,963
CD=3 EL 1006 WC=1100	180 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 1.00 EA EELEB		660.20 660	2.58 3	8000.00 8,000	400.00 400	9062.78 9,063
CD=3 EL 1007 WC=1100	210 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 2.00 EA EELEB	20.00 40	660.20 1,320	2.58 5	9000.00 18,000	450.00 900	10112.78 20,226
CD=3 EL 1008 WC=1100	305 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 1.00 EA EELEB	20.00	660.20 660	2.58 3	12000.00		13262.78 13,263
CD=3 EL 1010 WC=1100	320 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 5.00 EA EELEB	20.00	660.20 3,301	2.58 13	12000.00 60,000	600.00 3,000	13262.78 66,314
CD=3 EL 1011 WC=1100	380 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 1.00 EA EELEB		660.20 660		14000.00		15362.78 15,363
CD=3 EL 1012 WC=1100	570 TON VSD COOLING TOWER FAN AND CONTROLS	*** UNIT COSTS: *** 1.00 EA EELEB		660.20 660		17000.00 17,000		18512.78 18,513
TOTAL DIVISION	16 ELECTRICAL		240		31			
TOTAL FACILITY	AA. ELECTRICAL				31			

PETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS 1. BUILDING TO THE 5 FOOT LINE / BA. MECHANICAL

DETAIL PAGE

TIME 09:11:15

BASE BID

							BYZE BIT
DIVISION 15 MECHANICAL	QUANTITY UOM CREW	NANHR	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
15650 REFRIGERATION 15680 3000 PROPELLER TYPE COOLING TOWER	WITH FAN MOTOR						
CD=3 HV 3001 140 TONS WC=0900	*** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	12600.00 12,600		17178.72 17,179
CD=3 HV 3002 180 TONS WC=0900	*** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	16200.00 16,200		20958.72 20,959
CD=3 HV 3003 210 TONS WC=0900	*** UNIT COSTS: *** 2.00 EA MSPFO	134 269	3681.00 7,362	267.72 535	18900.00 37,800		23793.72 47,587
CD=3 HV 3004 305 TONS WC=0900	*** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	27450.00 27,450		32771.22 32,771
CD=3 HV 3005 320 TONS WC=0900	*** UNIT COSTS: *** 5.00 EA MSPFO	134 672	3681.00 18,405	267.72 1,339	28800.00 144,000		34188.72 170,944
CD=3 HV 3006 380 TONS WC=0900	*** UNIT COSTS: *** 1.00 EA MSPFO	134 134	3681.00 3,681	267.72 268	34200.00 34,200		39858.72 39,859
CD=3 HV 3007 570 TONS WC=0900	*** UNIT COSTS: *** 1.00 EA MSPFO	168 168	4601.25 4,601	334.65 335	51300.00 51,300		58800.90 58,801
TOTAL DIVISION 15 MECHANICAL		1646	45,092	3,280	323,550	16,178	388,099
TOTAL FACILITY BA. MECHANICAL		1646		3,280			
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE		1886	53,015	3,311	458,550	22,928	537,803
TOTAL BASE BID		1886	53,015	3,311	458,550	22,928	537,803
TOTAL ADDITIVE		0	0	0	0		0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY		1886		3,311			537,803

* * * END OF DETAIL REPORT * * *

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: CTEO40

PROJECT NOTES

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

TIME 09:11:15

SUMMARY PAGE 1

PROJECT NOTES

ECO-4: ABSORPTION CHILLER REPLACEMENT

SCOPE OF WORK: REPLACE EXISTING COOLING TOWERS ALONG WITH CHILLERS TO

INCREASE ENERGY EFFICIENCY.

CREW ID: ORL290

CURRENCY in DOLLARS PROJECT ID: CTEO40

U.S. ARMY CORPS of ENGINEERS N-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

BID ITEM AND FACILITY SUMMARY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

SUMMARY PAGE 2

TIME 09:11:15

BID	ITEM 1 I	BUILDING TO THE 5 FO	OOT LINE							BASE BID
ID	FACILITY		COST TO PRN	OVERHEAD	HONE OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTRICAL	1.00	EA 149,703	10.0% 14,970	0.0%	7.5% 12,351	2.5% 4,426	0.0%	181,450	181449.83
ВА	HECHANICAL	1.00	EA 388,099	10.0% 38,810	0.0	7.5 \ 32,018	2.5 % 11,473	0.0%	470,401	470400.63
BID	ITEM TOTAL	1.00	EA 537,803	53,780	0	44,369	15,899	0	651,850	651850.46
TOT	AL BASE BID		537,803	53,780	0	44,369	15,899	0	651,850	
TOT	AL ADDITIVE		0	0	0	0	0	0	0	
TOT	AL INCL ADD		537,803	53,780	0	44,369	15,899	0	651,850	

CURRENCY in DOLLARS PROJECT ID: CTEO40

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / PT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

TIME 09:11:15

SUMMARY PAGE 3

PROJECT (WE S	UHHARY
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 ID BID ITEM	NOU YTITMAUQ	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	651,851		651,851	651850.50
TOTAL CURRENT CONTRACT COST	•	651,851	0	651,851	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST		651,851	0	651,851	
Government-Furnished Property		0		0	
SUBTOTAL	-	651,851	0	651,851	
Contingencies	10.0%	65,185	0	65,185	
SUBTOTAL	-	717,036	0	717,036	
SIOH (S&A)	5.5%	39,437	0	39,437	
CURRENT WORKING ESTIMATE	-	756,473	0	756,473	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: CTEO40

CREW ID: ORL290

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

SUMMARY PAGE

TIME 09:11:15

CONTRACTOR DIRECT SUMMARY

ID	CONTRACTOR	PM	QUANTITY	UOH	MANHRS		EQUIPMENT					SUBCON W/OH&P	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	1886	53,015	3,311	481,478	537,803	100.0	È		0	537,803
	TOTAL DIRECT				1886	53,015	3,311	481,478	 537,803	100.0	ţ			

CURRENCY in DOLLARS

PROJECT ID: CTEO40

CONTRACTOR INDIRECT SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

TIME 09:11:15

SUMMARY PAGE 5

ID	CONTRACTOR	PM SUBTOI		* OVERHEA AMOUNT										CT ******* UNIT COST
<u></u>	GENERAL/PRIME	537,8	03	53,780	10.0%	0.0	 44,369	7.5%	2.5%	0.08	651,8	50 1	100.0%	651850.46
	TOTAL OVERHEAD & PROFIT			53,780	10.0%		 44,369	7.5%						

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: CTEO40

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

SUMMARY PAGE

TIME 09:11:15

OCT	DT	TERTAN	SUHHA	DU
1.0	1111	/ I S I I I N		

 ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT
15 MECHANICAL 16 ELECTRICAL	1646 240	45,092 7,922	3,280 31	323,550 135,000	16,178 6,750	388,099 149,703
TOTAL DIRECT	1886	53,015	3,311	458,550	22,928	537,803

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: CTEO40

SYSTEMS SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

TIME 09:11:15

SUMMARY PAGE 7

 						**** TOTAL *	
 ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL		DIRECT	
09 HEATING, VENTILATION & AIR CONDIT 11 INTERIOR ELECTRICAL	1646 240	45,092 7,922	3,280 31	323,550 135,000	16,178 6,750	388,099 149,703	
TOTAL DIRECT	1886	53,015	3,311	458,550	22,928	537,803	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: CTEO40

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

TIME 09:11:15

EQUIPMENT SUMMARY ECO-4: ABSORPTION CHILLERS - COOLING TOWERS SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS		ADJ FACTO		HRLY RATE	UPB RATE		COST
EMI20	CRANE, 22 TON, HYDRAULIC, SP SMALL TOOLS WELDING MACHINE, ELEC, 300 AM					24.63 1.40 1.62	24.63 1.40 1.62	78 532 392	1,931 744 635
TOTAL	PROJECT EQUIPMENT HOURS							1002	3,310

CURRENCY in DOLLARS PROJECT ID: CTEO40

TOTAL PROJECT MANHOURS

U.S. ARMY CORPS OF ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-4: ABSORPTION CHILLERS - COOLING TOWERS

SUNNARY PAGE 9

1886

53,015

TIME 09:11:15

LABOR SUHHARY

* * * END OF SUMMARY REPORT * * *

CURRENCY in DOLLARS

PROJECT ID: CTEO40 3-233

CREW ID: ORL290

WAUKESHA

Lean Combustion Gas Engine

3521 GL 554 to 773 BHP

DESIGN FEATURES

ENGINE

Breather - Extractor breather system.

Crankcase - Alloy cast iron, integral with cylinder frame. Seven large diameter main bearings.

Crankshaft- Drop forged, alloy steel, with hardened journals, dynamically balanced and fully counterweighted. Viscous vibration damper.

Cylinder heads - Six, interchangeable, valve-in-head type, with stellite faced intake and exhaust valves and seats. Prechamber and fuel control valves.

Connecting rods - Drop forged alloy steel, rifle drilled for piston pin lubrication and undercrown cooling.

Cylinders - Replaceable wet cylinder liners of centrifugally cast alloy iron.

Flywheel housing - SAE No.00.

Pistons - Aluminum alloy, oil cooled, with full floating piston pin.

STANDARD EQUIPMENT

AIR INDUCTION SYSTEM

Air Cleaner - Two stage dry element cleaner with rain shield and service indicator.

Turbocharger - Dry-type with wastegate.

Intercooler - Air-to-water.

CONTROL SYSTEM

Pneumatic controls, including pilot-operated valves for air starting and prelubrication.

Safety Shutdown - Mechanical fuel shutoff for low lube oil pressure, high water temperature, overspeed, high intake manifold temperature. Manual re-set.

EXHAUST SYSTEM

Cast iron, water-cooled manifold. Single vertical 6" (152mm) flange, ANSI 125#, at rear and flexible stainless steel exhaust connection.

FUEL SYSTEM

Natural gas carburetor and gas regulator. Prechamber fuel system and control logic.

Governor - Woodward UG-8 LD lever-controlled hydraulic governor.

IGNITION SYSTEM

Altronic III, high energy, solid state magneto with long duration coils, harness and ignition switch.

INSTRUMENTATION

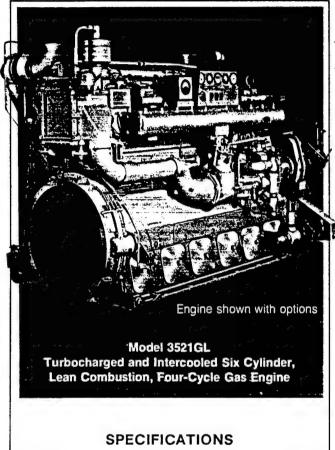
Engine mounted water temperature, oil pressure, oil temperature gauges. Digital electronic tachometer. Intake manifold temperature and intake manifold compound pressure/vacuum gauges. Exhaust thermocouples (7) with switch and jack.

LUBRICATION SYSTEM

Full pressure system with high-capacity gear-type pump, full flow oil filter with strainer and base-type oil pan. Shell-and-tube oil cooler with thermostatic control. Air/gas-motor driven prelubrication pump.

WATER CIRCULATION SYSTEM

Belt-driven jacket water pump, with thermostatically controlled, full-flow bypass cooling circuit. Auxiliary pump and circuit for intercooler and lube oil cooler.



Cylinders Inline 6
Piston Displacement
Bore & Stroke 9.375" X 8.5" (238 X 216 mm)
Compression Ratio
Jacket Water System Capacity48.5 gal. (1841)
Lube Oil System Capacity 66 gal. (2501)
Starting System 125-150 psi air/gas; 24/32V. electric
Dry Weight
Full Load Exhaust Emissions
NOx
CO 2 g/hph
HC. (non-methane) 1 g/hph

OPTIONAL EQUIPMENT

Controls - Woodward hydraulic or electric governors, pneumatic speed modulator, Waukesha Engomatic - Control Systems.

Cooling System - Radiator, heat exchanger, ebullient or hot water cooling.

Flywheel - Machined to customer specifications.

Power Take-off - Clutch PTO, stub shaft for direct

Starter - Air/gas or electric.



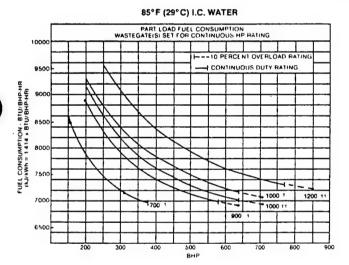
POWER RATINGS*

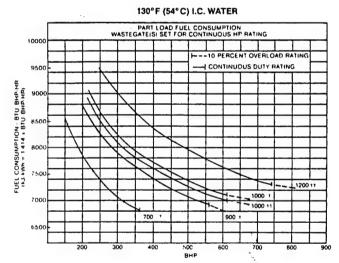
					•	-				•			
		INTERCOOLER 85°F (29°C) INLET WATER 130°F (54°C) TEMPERATURE											
	700 rpm	800 rpm	900 rpm	1,000 rpm	1,000 rpm	1,200 rpm		700 rpm	800 rpm	900 rpm	1,000 rpm	1,100 rpm	1,200 rpm
High Speed Turbocharger†	307	464	580	644	709	773	High Speed Turbocharger†	288	443	544	615	709	773
Low Speed Turbocharger††	383	516	580	644	_	-	Low Speed Turbocharger††	366	492	544	615	_	_

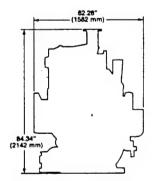
†High speed turbocharger match — 1001-1200 rpm ††Low speed turbocharger match — 700-1000 rpm

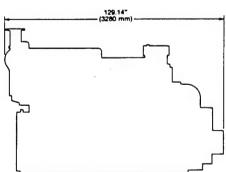
- *Rating Standard: All engine data is based on these conditions: barometric pressure—29.38 in (746 mm) mercury; inlet manifold air temperature—85°F (29°C). Altitude—500 ft. (152 m). Correction of ratings may be necessary for some high allitude or high inlet air temperature applications. Check Waukesha Engine Division Technical Data Book for factors.
- **Continuous Power Rating: The highest load and speed which can be applied—24 hours a day, seven days a week—except for normal maintenance. The rating includes operation of the engine at up to 10% overload for two hours in each 24 hour period.

FUEL CONSUMPTION









The manufacturer reserves the right to change or modify without notice, the design, equipment specifications or ratings as herein set forth without incurring any obligation either with respect to engines previously sold, or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

Waukesha Sales Offices Worldwide

Baltimore (301) 761 5350 Brussels (32) (2) 6604166 Calgary (403) 2668666

Caracas (58) (2) 979 0568 Chicago (312) 490 1115 Denver (303) 779 5675

(713) 893 4170

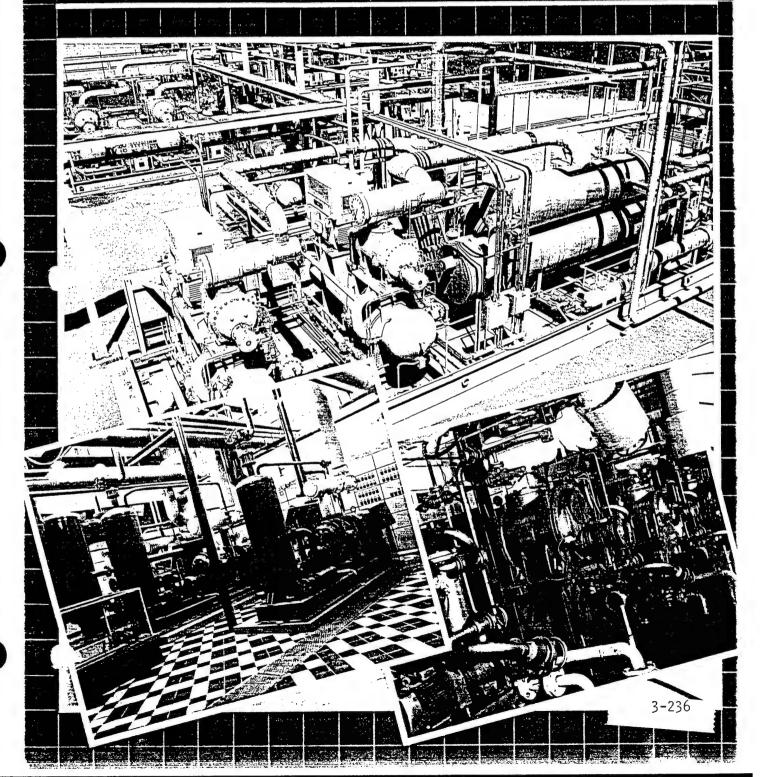
San Francisco (415) 283 7713 Singapore (65) 7377955



HOWDEN COMPRESSORS



GAS AND REFRIGERATION COMPRESSORS



HOWDEN COMPRESSORS

MOVATIVE ENGINEERING

bwden Compressors were the first company in the world to commercially produce screw compressors and have pioneered many major innovations, including oil injection. This concept was of prime importance in the advance of compressor technology. From the first screw compressor produced in 1938 to today's WRV 510, the largest screw compressor of its type in the world, Howden are at the forefront of compressor technology. The Howden WRV Gas and Refrigeration Screw Compressor is used throughout the world in plants for refrigeration and cold storage; for air conditioning; food freezing and storage including marine applications; mine cooling and ground freezing; heat pumps; oil dewaxing, chemical works and brewery cooling plant. Other applications include gas reliquefaction; fuel gas compression for gas turbines; underground air boosting; carbon dioxide recovery and natural gas gathering; and the compression of Helium, Propane, Butane, Methane, Hydrocarbon mixtures with H₂S, Hydrogen, LPG, Bitumen blowing air; R12, R22, R502 and R114, Propylene and Ammonia.

COMPREHENSIVE RANGE

Howden compressors are manufactured and supplied in a wide range of materials, special versions are available for higher pressure applications, with alternative bearings and for reverse rotation etc.

OPERATION

The compressor consists of two intermeshing asymmetric profile rotors mounted in a suitable casing. The action of the rotors is entirely rotary and there are no valves or other equivalent wearing parts. The operation ensures a continuous pulsation free delivery with no vibration and only light foundations are necessary.

CAPACITY CONTROL

The compressor is fitted with a built-in sliding control valve which controls the capacity of the machine by ering the point on the rotor length at which compression begins. Control down to 10 per cent with an proximately proportional saving in power is obtained. The sliding valve can be operated manually or automatically, by a hydraulic actuator. The oil pressure for the hydraulic actuator is provided from the compressor oil system.

LUBRICATION SYSTEM

A pressure lubrication system is employed incorporating an oil cooler having sufficient capacity to dissipate the heat of compression absorbed by the oil, ensuring that the discharge temperature never exceeds 100°C (212°F). Micronic filters are used and arranged for easy element changing. Alternatively liquid refrigerant injection can be used which reduces oil flow and eliminates an oil cooler. Details of the system and the effect on performance are available upon application.

INSTRUMENTATION

Appropriate indicators and protection devices are included in the standard instrument panel.

ADVANTAGES

Compact, rotary, vibration free unit having high capacity and requiring no special foundations. Simple design with minimum of wearing parts ensures extreme reliability and low maintenance costs. Due to the principle of operation and as there are no compressor valves, slugs of liquid can pass through the compressor without damage. Designed for continuous 24 hour per day duty.

SUPERFEED COMPRESSORS

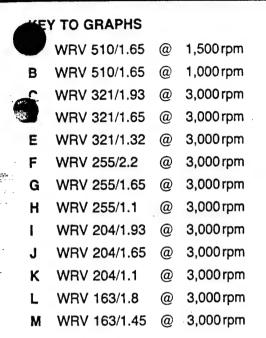
Howden WRV Compressors are supplied with a superfeed connection. This is a development of the screw mpressor whereby an additional charge of gas is passed into the compressor over and above that which is with a manner. This can increase the compressor refrigeration capacity by up to 60 per cent depending on refrigerant and duty, with a consequent improvement in compressor efficiency.

ELECTRICAL EQUIPMENT

Electrical equipment is offered to meet classifications ranging from standard industrial (indoor and outdoor) through to fully flameproof specifications, suitable for Zone I or II hazardous areas.

TYPICAL PERFORMANCE

AMMONIA



NOTES:

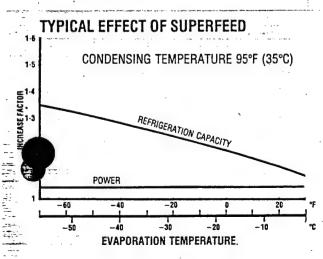
Refrigeration capacity based on 5.6°C (10°F) superheat at compressor suction and no sub-cooling of condensed liquid.

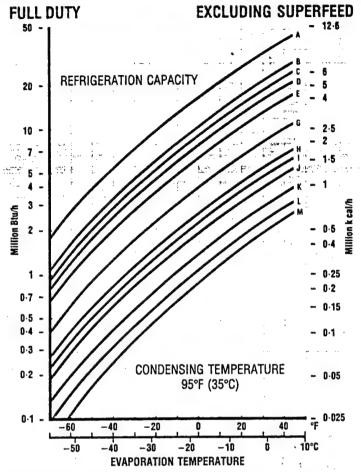
allowance has been made for pressure esses between the evaporator and the comressor suction flange.

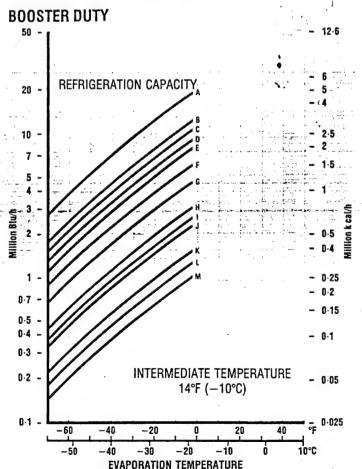
Compressors suitable for condensing temperatures up to 135°F (57°C).

In order to obtain the equivalent performance with 60 cps electrical supply, i.e. 3,600 rpm, multiply value from graph by 1.2.

In order to obtain a performance at 3,600 rpm and measured in "Tons" of refrigeration the value from the graph in BTU per hour is multiplied by 1.2 and divided by 12,000 which is the same as dividing by 10,000.







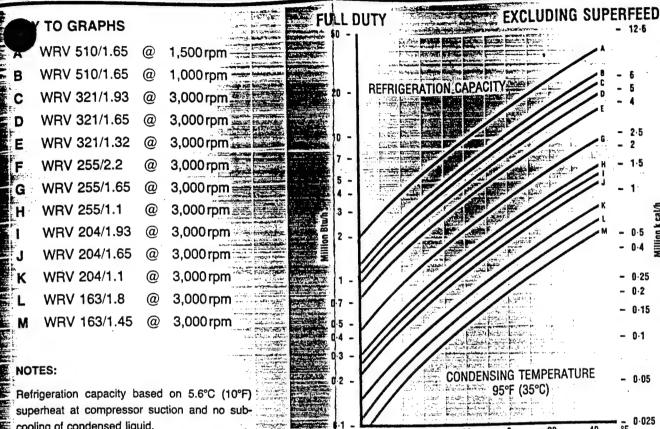
0.2

0.15

- 0.05

0.025

YPICAL PERFORMANCE



cooling of condensed liquid.

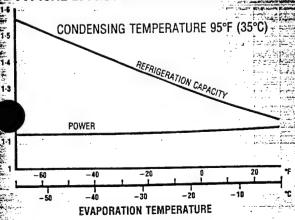
allowance has been made for pressure losses between the evaporator and the compressor suction flange.

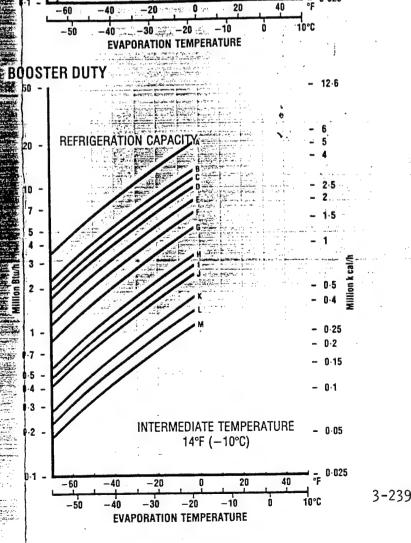
Compressors suitable for condensing temperatures up to 135°F (57°C).

In order to obtain the equivalent performance with 60 cps electrical supply, i.e. 3,600 rpm, multiply value from graph by 1.2.

In order to obtain a performance at 3,600 rpm and measured in "Tons" of refrigeration the value from the graph in BTU per hour is multiplied by 1.2 and divided by 12,000 which is the same as dividing by 10,000.

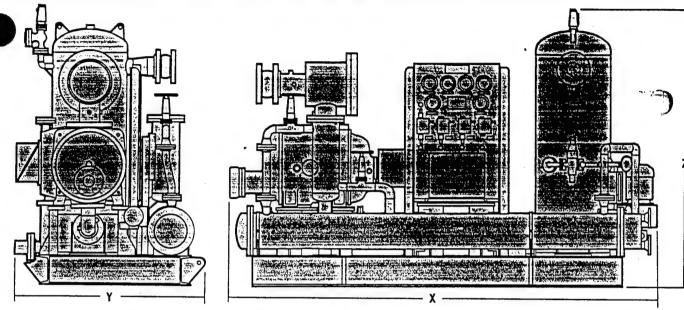
TYPICAL EFFECT OF SUPERFEED





TECHNICAL DATA

ENGINEERED SETS



Howden engineered compressor sets are available as standard or to customer specification, depending on application, duty and choice of ancillary equipment.

Howden			Com	pressor S	et Dime	ens	ions†			Compressor					
Compressor Specification	X L	ength		Y	Width ft ir	1	Z F	leight ft	in	Set W	/eight* Ib				
WRV 163/1.45	3100	10	_	1000											
		10	2	1200	3 1		2000	6	7	1550	3417				
WRV 163/1.8	3200	10	6	1200	3 1	1	2000	6	7	1600	3527				
WRV 204/1.1	3300	10	8	1300	4 :	3	2000	6	7	1810	3990				
WRV 204/1.65	3500	11	6	1300	4 3	3	2000	6	7	2040	4497				
WRV 204/1.93	3500	11	6	1300	4 3	3	2000	6	7	2050	4519				
WRV 255/1.1	3600	11	10	1400	4	7	2150	7	1	3025	6669				
WRV 255/1.65	4100	13	5	1400	4	7	2150	7	1	3175	7000				
WRV 255/2.2	4100	13	5	1400	4	7	2150	7	1	3300	7275				
WRV 321/1.32	4300	14	1	1700	5 7	7	2600	8	6	7250	15983				
WRV 321/1.65	4500	14	9	1700	5 7	7	2600	8	6	7500	16535				
WRV 321/1.93	4700	15	5	1700	5 7	7	2600	8	6	7575	16700				
WRV 510/1.65	4750	15	7	3000	9 10	o	3160	10	2	18500	40785				

- * Weights do not include drive units or cooler.
- † Dimensions of engineered sets may vary according to specification of equipment.

These figures are indicative only. Your application and duty, together with choice of ancillary equipment may dictate a different format. Howden compressor sets are engineered to meet all relevant international standards. All pressure vessels are designed to ASME VIII, however other codes may be worked to, if specified.

Howden Compressors Ltd provide the enclosed data as a guide to their product range. All data is subject to revision and modification. Current data must be confirmed at time of ordering.

HOWDEN COMPRESSORS LIMITED



133 Barfillan Drive, Glasgow G52 1BE Telephone 041-882 3346 Telex 778711 Fax 041-882 8648

HOWDEN COMPRESSORS

 $How den \, Compressors \, Incorporated \,$

23 Old Windsor Road Bloomfield, CT 06002 Telephone (203) 242-7351 Telex 643-226 Fax (203) 242-3782

A Howden Group Company



SECTION 4

VOLUME 1
INTRODUCTION 4-1
PROGRAMMING DOCUMENT 4-2
ECO-5 PROJECT SUMMARY
PROJECT LCC ANALYSIS
BLDG 38
BLDG 89
BLDG 95
BLDG 2745
BLDG 3202
VOLUME 2
BLDG 3204
BLDG 3206
BLDG 3207
BLDG 3209
BLDG 3307
BLDG 3308

BLDG 5212
BLDG 5661
BLDG 5702
BLDG 5207
BLDG 5740
BLDG 6087
BLDG 6088
BLDG 6254
BLDG 6302
BLDG 6304
BLDG 6306
BLDG 6308
BLDG 6390
BLDG 6708
BLDG 6713
BLDG 6714
BLDG 6715
BLDG 6717
BLDG 6720
BLDG 6723

BLDG 6729	-466
BLDG 7510	-479
BLDG 7514	-493
BLDG 7541	-507
BLDG 7543	-523
BLDG 7562	l- 5 36
BLDG 75744	l-549
HAMMOND HEIGHTS 4	-562
LAPOINTE VILLAGE	l-575
LEE VILLAGE4	I-588
PIERCE VILLAGE 4	I-602
CATALOG CUT SHEETS	L-615

The ECO evaluation consisted of determining appropriate lighting replacements to improve lighting system efficiency while achieving recommended illumination levels. The ECO includes comprehensive lighting replacements.

LIGHTING SYSTEM REPLACEMENTS ECO 5

EXISTING LIGHTING

REPLACEMENT LIGHTING

T-12 Fluorescent Fixture	T-8 Fluorescent Fixture with reflector
T-12 Lamp	T-8 Lamp
Magnetic Ballast	Electronic Ballast

Incandescent Fixture	Compact Fluorescent Fixture
Incandescent Lamp	Compact Fluorescent Lamp and Ballast
Incandescent Exit Sign	LED (Light Emitting Diode) Exit Sign

Mercury Vapor Fixture	High Pressure Sodium Fixture
Mercury Vapor Ballast	Electronic Ballast
Mercury Vapor Lamp	High Pressure Sodium Lamp

The lighting replacements are for administrative, warehouse, maintenance, and retail facilities and roadway lighting.

This section contains the programming documentation for ECIP Project 2, improvement of indoor/outdoor lighting efficiency. Included are the project development brochures, 1391 forms, life cycle cost analysis, cost estimates for each building, and energy calculations for each building. Catalog cut sheets are included as an appendix to the document (located at the end of this section) to represent the replacement products.

The life cycle analysis, Sections 3A and 3B, refers to non-energy savings or costs present. For this project, Section 3A, Annual Recurring, reflects maintenance savings available by replacing the existing lighting systems. The new fixtures, due to the use of reflectors, have fewer lamps which saves on material and labor replacement. Compact fluorescents are rated for 10,000 hours versus 750 hours for an incandescent lamp which saves labor for replacements. LED exit signs have similar savings.

Section 3B, Non-Recurring Savings/Costs, refers to the replacement of parts of the existing lighting system. Many fluorescent fixtures surveyed were approaching the end of their economic life. On the spreadsheets included for fluorescent fixture replacement for each building, the higher wattage fixture for each type was replaced in this section. Mercury vapor fixtures were also replaced in 3B due to the termination of their manufacturing in the year 2000.

facility

INTERIOR/EXTERIOR LIGHTING REPLACEMENT

Fort Campbell, Kentucky

project coordinator for using service

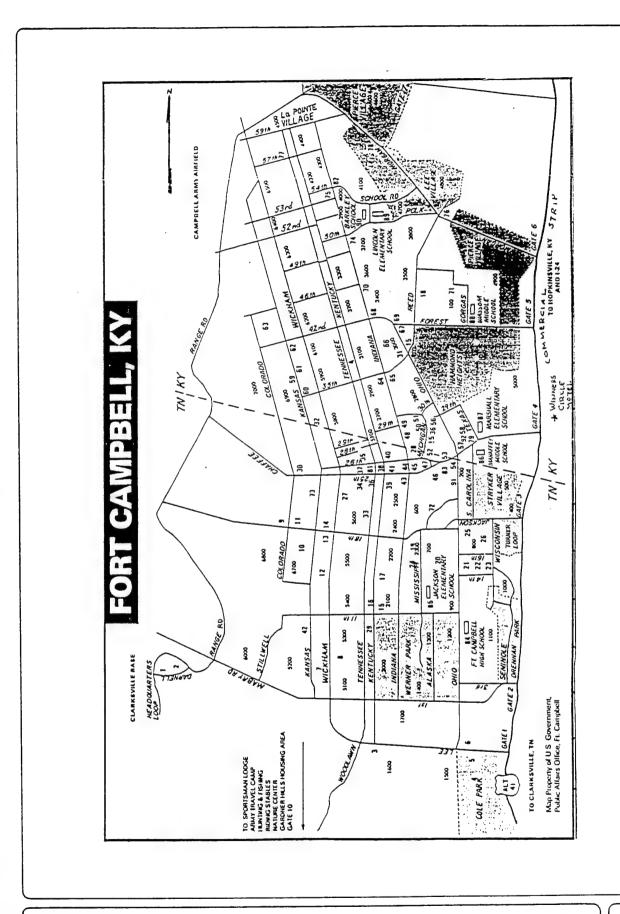
Arlin Wright

functional requirements summary, PDB-1

OBJECTIVE:

The objective of this project is to replace existing interior and exterior lighting with higher efficiency fixtures and lamps. The replacement of the existing lighting will reduce energy consumption and life cycle operating costs for the subject facilities in accordance with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759.

functional requirements summary, PDB-1



facilities requirements sketch, PDB- ½

APPENDIX C DOCUMENTATION CHECKLIST

A. SPECIAL CONSIDERATIONS

	ITEM	Required Not Reg	To Be Determin	Commen Attached	Documer Attached
A-1	Cost estimates for each primary and supporting facility	R_	_0_		1
A-2	Telecommunications system coordination with USACC and authorization for exceptions	_NR_			
A-3	Coordination with state and local governmental requirements (blind vendors, medical facilities, construction and operating permits, clearinghouse ecoordination, etc.)	R	А		
A-4	Assignment of airspace	NR			
A-5	Economic analysis of alternatives	R	D		
A-6	Approval for new starts	NR			
A-7	International balance of payments (IBOP) coordination with U.S. European command and NATO—overseas cost estimates and comparables (include rate of exchange used in estimates)	NR			
8-A	Impact on historic places—on site survey by authorized archeologist and coordination with state historic preservation officer and advisory council on historic preservation	NR			
4.9	Exceptions to established criteria	NR			
4-10	Coordination with various staff agencies (Provost Marshall-physical security, etc.)	R			
1-11	Identification of related or support projects (so projects can be coordinated)	R			
.12	Required completion date	R			
	1. See Appendix A				

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED -- Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E — Other (Check Comments Attached and explain)

documentation checklist

Required or Not Required B. SITE DEVELOPMENT ITEM Consultation with the District Office to determine and evaluate flood plain hazards NR Preparation, submission, and/or approval of new NR General Site Plan (A) NR (B) (C) Sketch Site Plan NR (D) Facilities Requirements Sketch R B-3 Preparation of NR (A) Site Survey Subsoil information (B) NR Approval by Department of Defense Explosive Safety Board (DDESB) for Safety Site Plan B-4 NR Other Site Development Considerations (List and number items) 1. See Project Development Brochure, PDB-1/2

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

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A - DFAE

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E - Other (Check Comments Attached and explain)

documentation checklist

C. ARCHITECTURAL & STRUCTURAL Document ITEM NR Reconciliation with troop housing programs and requirements Evaluation of existing facilities (including degree of utilization) R D C-2 Approval for removal and relocation of existing useable facilities NR C-3 NR Evaluation of off-post community facilities C-4 Storage and maintenance facilities (including nuclear weapons) NR C-B Coordination hospitals, medical and dental facilities with Surgeon General NR C-6 Coordination of aviation facilities with FAA NR C-7 C-8 Coordination air traffic control and navigational aids with USACC NR NR Tabulation of types and numbers of aircraft Evaluation of laboratory, research and development, and technical maintenance facilities NR C-10 NR Coordination chapels with Chief of Chaplains C-11 Review food service facilities by USATSA NR C-12 Automated data processing system or equipment approvals-cost analysis when ADP and/or 42 communication centers not co-located with related facilities NR Coordination postal facilities with U.S. Postal Service Regional Director C-14 NR Laundry and dry cleaning facilities coordination with ASD(1&L) NR C-15 Tenant facilities coordination with installation where sited C-16 NR Facilities for or exposed to explosions, toxic chemicals, or ammunition—review by DDESB (See C-17 also Item B-4) NR C-18 Analysis of deficiencies R D Consideration of alternatives R D 2 C-19 Determination whether occupants will Include physically handicapped or disabled persons NR C-20 C As-build drawings for alterations or additions R C-21 NR C-22 Availability of Standard Design or site adaptable designs Other Architectural & Structural (List and number items) 1. See Supplemental Data Detailed Project Justification Paragraph D3. 2. See Supplemental Data Detailed Project Justification Paragraph D4.

REQUIRED OR NOT REQUIRED — Not relevant or no information to cominunicate. Enter "R" If Item is relevant and is required for this project. Enter "NR" If Item is irrelevant and is not required for this project.

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*BY WHOM (Check and insert appropriate letter)

- A DFAE
- B Using Service
- C Construction Service
- D Designe
- E Other (Check Comments Attached and explain)

documentation checklist

D. MECHANICAL, ELECTRICAL, & UTILITY SYSTEMS

			Red	E E	Commen	Docume	
	ITEM	100	Not Reg	To Be Determir	Att	Att	
D-1	Fuel considerations and cost comparison analysis	_	R.	<u>D</u>			
D-2	Energy requirements appraisal (ERA)		<u>R</u>	<u> </u>			
D-3	Conformance with DOD Energy Reduction requirements	-	<u>R</u>	_ <u>P_</u>			
D-4	Evaluation of existing and/or proposed utility systems	-	_R	_D			
	Other Mechanical and Utility Systems (List and number items)						
	1. See Special Requirements, Paragraph 3 (SRP-3)						
					<u> </u>		
		$\ \cdot\ $					
						1	

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

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A - DFAE

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and

explain)

documentation checklist

E. ENVIRONMENTAL CONSIDERATIONS

	ITÉM	Required Not Req	To Be Determir	Commen	Docume
				04	0 4
E-1	Environmental impact assessment	R_		<u> </u>	
E-2	EIA conclusions require Environmental Impact Statement	NR -	-	 	
E-3	Determination of health, environmental or related hazards. Assistance to determine existence of any health, environmental or related hazard may be requested from Aberdeen Proving Ground, MD 21010, the Office of the Surgeon General, Attn: DASG-HCH (Army Environmental Hygiene Agency)	NR			
E-4	Air/water poliution permit, coordination with agencies and compliance with standards at Federal, state and local level	NR			
E-5	Corrective measures associated with Environmental Impact Statements or assessment—list separately and evaluate.	NR			
	Other environmental considerations (list and number items)				
	1. See Supplemental Data Detailed Project Justification				
	Paragraph D9.	-	1	1	
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					1
1				1	

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" If item is relevant and is required for this project. Enter "NR" If item is irrelevant and is not required for this project.

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*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and

explain)

documentation checklist

APPENDIX D TECHNICAL DATA CHECKLIST

A. SPECIAL CONSIDERATIONS

	ITEM
A-1	Factors of risk, restriction or unusual circumstance expected to increase costs beyond applicable area averages
A-2	Construction phasing requirements
A-3	Functional support equipment (mechanical, electrical, structural, and security) to be built in
A-4	Equipment in place and justification
A-5	Other equipment and furniture (O&MA, OPA) and costs
A-6	Special studies and tests (hazards analyses, compatibility testing, new technology testing, etc.)
A-7	Type of construction (permanent, temporary, semi-permanent)
A-8 A-7 A-8	Government furnished equipment (quantities, procurement time, availability and special handling and storage requirements). Funds used for procurement.
	Other special considerations (list and number items)

Required or Not Required	To Be Determined	Comment Attached	Document Attached
NR			
R	Δ_		
NR			
NR NR NR			
NR	 		
NR		 	
NR	<u> </u>		
NR			

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project.

Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and

explain)

technical data checklist

4-12

D-5

Required or Not Required B. SITE DEVELOPMENT To Be Determined Document Attached Comment ITEM Construction restrictions or guidelines pertaining to R Α site access and preferred construction routes (A) (B) Airfield clearance, explosive storage, working hours, safety, etc. NR(C) Facilities and/or functions or adjoining areas (structures, materials, impact) R Α Real estate actions (acquisition, disposal, lease, right-of-way) B-2 NR Demolition/relocation required (data) B-3 (A) Special considerations due to explosives/radioactivity/ chemical contamination/asbestos emissions/toxic gases Α Restrictions on disposal of demolished/relocated material (B) including hazardous waste NR R-4 Pavement types and requirements (including traffic surveys and MTMC coordination) NR B - 5 Landscape considerations R Protection of existing vegetation (A) (B) Stockpile topsoil NR Other Site Development (List and number items) 1. There is a possibility that the existing lighting may contain PCB's in the ballasts.

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E ~ Other (Check Comments Attached and explain)

technical data checklist

C. ARCHITECTURAL & STRUCTURAL **ITEM** Vibration-producing aquipment requiring isolation R D C-1 Seismic zone and other design load criteria (typhoon, hurricans, earthquake loads, high or low C-2 NR loss potential) Protective shelter evaluation and resistant design criteria (conventional/nuclear blast and radia-C-3 NR Unusual foundation requirements (pier, pile, caisson, deep foundations, mat, special treatment, C-4 NR permafrost areas, soil bearing) Designation and strength of units to be accommodated NR C-E Requirements and data for special design projects NR C-6 Unusual floor and roof loads (safes, equipment) NR C-7 Security features (arms rooms, vaults, interior secure areas) NR Other Architectural & Structural (List and number items)

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

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A - DFAE

B - Using Service

C - Construction Service

D - Designer

E - Other (Check Comments Attached and explain)

technical data checklist

D. MECHANICAL, ELECTRICAL, & UTILITY SYSTEMS

	İTEM	Required Not Requ	To Be Determin	Commen	Documen Attached
D-1	Special mechanical requirements or considerations (elevator, cranc, hoist, etc.)	NR			
D-2	Special peak usage periods and peak leveling techniques	NR			{
D-3	Maintenance considerations (accessibility of equipment, compatibility with existing equipment)	R	D		
D-4	Plumbing—availability, general system type and characteristics (proposed and/or existing, incl. compressed air and gas)	R	D		
D-5	Heating—availability, general system type and characteristics (proposed and/or existing)	NR			
D-6	Ventilating, air condition/refrigeration—availability, general system type and characteristics (proposed and/or existing)	R	D		
D-7	Electrical—availability, general system type and characteristics incl. airfield lighting, communication, etc. (proposed and/or existing)	NR			
D-8	Water supply/waste treatment—availability, general system type and characteristics (proposed and/or existing)	NR			
D-9	Energy requirements/fuel conversion (sources, availability, loads, types of fuel, etc.)	R	D		
D-10	Solar energy evaluation	NR			

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached.

DOCUMENT ATTACHED — Significant information is in an existing document which is attached,

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designer

E — Other (Check Comments Attached and explain)

technical data checklist

Required or Not Required E. ENVIRONMENTAL CONSIDERATIONS Document **ITEM** NR Waste water treatment, air quality, and solid waste disposal criteria Other Environmental Considerations (List and number items)

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project. Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

 $\mbox{COMMENT ATTACHED} = \mbox{Significant information summarized or explained} \\ \mbox{and attached.}$

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C — Construction Service

D - Designer

E - Other (Check Comments Attached and explain)

technical data checklist

To Be Determined F. FIRE PROTECTION ITEM Special fire protection systems or features (detection and suppression equipment, hazards, etc.) NR F-1 Other Fire Protection Considerations (List and number items)

REQUIRED OR NOT REQUIRED — Not relevant or no information to communicate. Enter "R" if item is relevant and is required for this project.

Enter "NR" if item is irrelevant and is not required for this project.

TO BE DETERMINED — Information needed but not currently available. Enter code for information source.

COMMENT ATTACHED — Significant information summarized or explained and attached

DOCUMENT ATTACHED — Significant information is in an existing document which is attached.

*BY WHOM (Check and insert appropriate letter)

A - DFAE

B - Using Service

C - Construction Service

D - Designe

E - Other (Check Comments Attached and

technical data checklist

4-1/

1. COMPONENT ARMY	FY 1	9 <u>94</u> MILITARY CO	ONSTRU	JCTI	ON PRO	IJΕ	CT DATA	- 1	2. DATE 06 Oc	tober 93														
13 INSTALLATION AND LUCATION			ROJECT TITLE INTERIOR/EXTERIOR LIGHTING REPLACEMENT																					
5. PROGRAM ELEMENT		6. CATEGORY CODE	7. PROJECT NUMBER ECIP #2				8. PROJECT COST (\$000 \$1,0		8. PROJECT CO		8. PROJECT		8. PROJECT		8. PROJECT		8. PROJECT		8. PROJECT		8. PROJECT		DJECT COST (\$000) \$1,050	
		9.	COST EST	IMATE	s																			
		ITEM			U/M	Q	UANTITY	L.	UNIT COST	COST (\$000)														
Primary Facility																								
Interior and	d Exterior	Light Fixtures			Lot		1	:	900,000	900														
Subtotal										900														
Contingency (10%)									100															
Total Cont	ract Cost							•		1,000														
Supervisio	n, Inspec	tion and Overhead (5.0%	.)							50														
Total Requ	iest									1,050														

10. DESCRIPTION OF PROPOSED CONSTRUCTION

The existing interior lighting is a combination of standard efficiency fluorescent fixtures, incandescents, and incandescent exit signs. The existing exterior lighting is a combination of 175W and 400W mercury vapor and 100W high pressure sodium fixtures. The proposed project will replace the interior fluorescent fixtures with T-8's, incandescents with compact fluorescents, and exit signs with LED's. The implementation of this project will save 5725 MBtu/Yr of electrical energy. The first year savings is \$142,057 and the Savings to Investment Ratio (SIR) is 1.48.

11. REQUIREMENT

Project: The proposed interior/exterior lighting project replaces thirty-eight (38) buildings and four (4) exterior locations lighting with energy efficient lighting.

Requirement: The project is required to reduce the energy consumption of lighting and to comply with the Army Energy Resources Management Plan (ERMP) and Executive Order 12759. The proposed project will reduce annual energy consumption by 5725 MBTU/YR and annual energy cost by \$142,057

Current Situation: The existing lighting in building numbers 38, 89, 95, 2745, 3202, 3204, 3206, 3207, 3209, 3307, 3308, 5207, 5212, 5661, 5702, 5740, 6087, 6088, 6254, 6302, 6304, 6306, 6308, 6390, 6708, 6713, 6714, 6715, 6717, 6720, 6723, 6729, 7510, 7514, 7541, 7543,7562, 7574 and exterior areas at Pierce Village, LaPointe Village, Hammond Heights, and Lee Village is inefficient fluorescent, incandescent and mercury vapor.

PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

DD FORM 1391 1 DEC 76

1. COMPONENT ARMY	FY 19	94 MILITARY O	CONSTRU	JCTI	ON PR	OJE	CT DAT		DATE 06 Oc	tober 93
3. INSTALLATION AND LOCATION				OJECT TITL NTERIOR	_	RIOR LIG	HTIN	G REPLA	ACEMENT	
5. PROGRAM ELEMENT		6. CATEGORY CODE	7. PROJE		8. PROJECT COST (\$000) ECIP #2 \$1,074					
			9. COST EST	IMATE	s					
		ITEM			U/M	QL	JANTITY	_	JNIT OST	COST (\$000)
Primary Facility										
Interior and	Exterior	Light Fixtures			Lot		1	9	29,534	929
Subtotal										929
Contingend	cy (10%)									93
Total Contract Cost									1,022	
Supervision, Inspection and Overhead (5.0%)									52	
Total Requ	est									1,074

10. DESCRIPTION OF PROPOSED CONSTRUCTION

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DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
UNTIL EXHAUSTED

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(WHEN DATA IS ENTERED)

1. COMPONENT ARMY	FY 19 94 MILITARY CONSTRUCTION PROJECT	2. DATE 06 October 93	
3. INSTALLATION AND Fort Campbel			
4. PROJECT TITLE	TERIOR/EXTERIOR LIGHTING REPLACEMENT	PROJECT NUMBER ECIP #2	

Impact if not provided: If the proposed project is not funded, a reduction of 5725 MBtu/YR cannot be achieved, and excessive amounts of energy will continue to be used. There will be no contribution to energy reduction goals established for United States Army facilities by Army Headquarters.

Colonel, USA Commanding

ESTIMATED CONSTRUCTION START:

October 1994

INDEX:

ESTIMATED MIDPOINT OF CONSTRUCTION:

April 1995

INDEX:

ESTIMATED CONSTRUCTION COMPLETION:

November 1995

INDEX:

DETAILED JUSTIFICATIONS

D1. GENERAL

The proposed project encompasses the replacement of lighting in thirty-eight (38) buildings and four (4) family housing areas. The project will decrease the energy consumption of the lighting system without reducing light levels except where necessary.

D2. ACCOMMODATIONS NOW IN USE:

The existing lighting systems are comprised of standard efficiency fluorescent, incandescent, and mercury vapor fixtures.

D3. ANALYSIS OF DEFICIENCY:

Currently, thirty-eight (38) buildings and four (4) family housing areas are using standard or low efficiency fixtures for lighting. The purpose of this project is to replace the existing lighting with new light fixtures which are much more efficient. The current deficiency results in large amounts of energy usage to maintain adequate lighting.

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(WHEN DATA IS ENTERED)

1. COMPONENT ARMY	2. DATE 06 October 93	3						
	3. INSTALLATION AND LOCATION Fort Campbell, Kentucky							
4. PROJECT TITLE	5. PROJECT NUMBER ECIP #2							

D4. CONSIDERATION OF ALTERNATIVES:

The only alternatives to proposed project are to install lower efficiency light fixtures. The disadvantages of using lower efficiency light fixtures is that less energy savings can be realized without significantly reducing the construction cost. If a less efficient light fixture is selected, the project would have a lower SIR.

D5. CRITERIA FOR PROPOSED PROJECT:

The proposed project will conform with all applicable federal and United States Army Regulations.

D6. PROGRAM FOR RELATED EQUIPMENT:

No equipment funded from appropriations other than MCA are required.

D7. DISPOSAL OF PRESENT ASSETS:

Light fixtures in thirty-eight (38) buildings and four (4) family housing areas will be disposed.

D8. SURVIVAL FACILITIES:

The proposed project is not suitable for inclusion of protective shelters.

D9. SUMMARY OF ENVIRONMENTAL CONSEQUENCES:

The proposed project has been analyzed and will not adversely impact the environment. Energy savings resulting from the project will conserve natural resources.

D10. EVALUATION OF FLOOD HAZARDS AND ENCROACHMENT ON WETLANDS:

It has been determined that these facilities are not located in a flood plain and they do not encroach on wetlands.

D11. ECONOMIC JUSTIFICATION:

The proposed project qualifies under ECIP Guidelines in AR-415-15. SIR for the project is 1.48 with a simple payback of 7.56 years.

See Economic Analysis, SRP-1

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
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1, COMPONENT ARMY	FY 19 94 MILITARY CONSTRUCTION PROJE		2. DATE 06 October 93					
	3. INSTALLATION AND LOCATION Fort Campbell, Kentucky							
4. PROJECT TITLE	INTERIOR/EXTERIOR LIGHTING REPLACEMENTS	5. PROJECT NU	MBER ECIP #2					

D12. UTILITY AND COMMUNICATION SUPPORT:

- A. No related utility support projects are programmed. Adequate utilities are available to support the project.
- B. No telecommunication support is required.

D13. PROTECTION OF HISTORIC PLACES AND ARCHEOLOGICAL SITES:

The project involves the replacement of light fixtures located in existing buildings and family housing areas. Review procedures have been implemented for this project in accordance with 36 CFT 800. The review has established that there will be no effect.

D14. PROJECT DEVELOPMENT BROCHURE (PART 1):

A Project Development Brochure was prepared on 06 October 93 and is attached as a part of the programming documentation.

D15. ENERGY REQUIREMENTS:

The proposed project will reduce present energy consumption by 5725 MBtu/Yr at the cost savings of \$43,242 per year. See Energy Requirements Appraisal (ERA) in Special Requirements, Paragraph 3 (SRP-3).

D16. PROVISION FOR THE HANDICAPPED:

No provisions for the handicapped will be made since the scope of the project is in no way applicable to designing for the handicapped.

D17. REAL PROPERTY MAINTENANCE ACTIVITY (RPMA) ANALYSIS:

A. Physical impact: There will be light fixtures removed and replace by the same number of light fixtures. No new structures will be added.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

1, COMPONENT ARMY	JECT DATA	2. DATE 06 October 93						
	INSTALLATION AND LOCATION Fort Campbell, Kentucky							
4. PROJECT TITLE	IMBER ECIP #2							

0014

B. Operations and Maintenance (O&M) impact:

	O&M
YEAR	NET CHANGE (\$000)
1994	0.0
(BOD)	0.0
1995	0.0
1996	0.0

C. Backlog of Maintenance and Repair (BMAR) impact:

There will be no net change in the number of fixtures or in fixture life expectancy. There will be no effect on BMAR.

D18. COMMERCIAL ACTIVITIES:

The proposed project is not a "New Start Expansion" as defined by DA Circular 235-1. The project has been reviewed in light of the requirements of commercial and industrial facilities. It has been determined that whereas the project does not affect commercial facilities, the requirements of DA Circular 235-1 does not apply.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

COMPONENT ARMY FY 19 94 MILITARY CONSTRUCTION PROJECT DATA						2. DATE 06 October 93	
installation and Lo Fort Campbell							
PROJECT TITLE	TERIOR LIQUITING DI		MENTO		5. PROJECT NU		40
INTERIOREX	TERIOR LIGHTING RI	EPLACE	MENIS			ECIP	#4
SPECIAL RECUL	REMENTS PARAGRA	PH 1 (SE	RP-1)·				
		(0.					
Life Cycle Cost A Proiect Title: Inte	nalysis rior/Exterior Lighting R	eplaceme	ents				
Fiscal Year: 199							
Analysis Date 09/	30/93						
Economic Life: Fi	fteen (15) Years						
1. INVESTMENT							
A. CONSTRUC	TION COST			\$976,010			
B. SIOH				\$48,801			
C. DESIGN				\$48,801			
	Y CREDIT CALC			-0-			
E. SALVAG F. TOTAL IN				-0- \$\$1,073,612			
				•			
ANALYSIS DAT	SS E ANNUAL SAVINGS, UNIT	COST & D	ISCOUNTED SAVIN	GS			
FUEL	CC \$Mbi	ST tu (1)	SAVINGS MBtu/YR(2)	ANNUAL SAVINGS	DISCO B) FACTO		DISCOUNTE SAVINGS(5
A. ELECT		18	5725	35,381	11.3	` '	416,429
B. DIST							
C. RESID							
D. NG							
E. DEMAND SAVIN	IGS			59,268			
F. TOTAL	N/INO0		5725	94,649			1,075,489
3. NON-ENERGY SA							612.004
A. ANNUAL REC			11.12				\$12,984
• •	TED SAVINGS		11.14				\$144,382
	RRING SAVINGS						Ţ. / 1,00£
ITEM	•	IGS(+) T(-)(1)	YEAR OF OCCURRENCE(2)	DISCOUN' FACTOR	T DISCOL SAVING COST	INTED GS(+) (-)(4)	
a. Replace Interi	or 418,	,539	9	0.70	292,9		
b. Replace Exte			8	0.73	71,4	19	
C.							

DD FORM 1391 1 DEC 76

d. Total

PREVIOUS EDITIONS MAY BE USED INTERNALLY UNTIL EXHAUSTED

516,373

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST(-)

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(WHEN DATA IS ENTERED)

364,396

508,778

2. DATE 1. COMPONENT 06 October 93 ARMY FY 19 94 MILITARY CONSTRUCTION PROJECT DATA 3. INSTALLATION AND LOCATION Fort Campbell, Kentucky 5. PROJECT NUMBER 4. PROJECT TITLE INTERIOR/EXTERIOR LIGHTING REPLACEMENTS ECIP #2 SPECIAL REQUIREMENTS PARAGRAPH 1 (SRP-1) (continued) D. PROJECT NON ENERGY QUALIFICATION TEST (1) 25% NON ENERGY CALC 4. FIRST YEAR DOLLAR SAVINGS \$142,057 5. TOTAL NET DISCOUNTED SAVINGS \$1,584,267 6. DISCOUNTED SAVINGS RATIO 1.48

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED UNTIL EXHAUSTED

FOR OFFICIAL USE ONLY (WHEN DATA IS ENTERED)

1. COMPONENT ARMY	2. DATE 06 October 93			
3. INSTALLATION AN Fort Campbell,				
4. PROJECT TITLE	5. PROJECT NU	MBER FCIP #2		

SPECIAL REQUIREMENTS PARAGRAPH 3 (SRP-3):

Energy Requirements Appraisal (ERA)

- 1. Project Description: Replace existing lighting systems with more efficient lighting systems without reducing the light levels.
- 2. Estimated Energy Consumption: The building are currently lit by standard efficiency lighting. The existing lighting system consumes 9,263 MBtu/Yr of energy. Replacing the existing lighting with high efficiency lighting will result in 5725 MBtu/Yr of electrical energy savings, a sixty-two percent (62%) reduction in current energy consumption.
- 3. Energy Sources: No new energy sources are required for the proposed project. The use of solar energy for this project is impractical.
- 4. Energy Use Impacts: The proposed project will substantially reduce the consumption of electricity for lighting. The burden on the existing base distribution system will be lessened.
- 5. Energy Conservation: The proposed project will reduce annual energy consumption by 5725 MBtu/Yr with annual energy cost savings of \$142,057. The project complies with Army Resources Management Plan (ERMP) and Executive Order 12759.
- 6. Energy Alternatives: The proposed project represents the greatest possible reduction in energy consumption sixty-two percent (62%), without reducing the current lighting levels. The current levels do not exceed the levels recommended by ASHRAE.
- 7. Energy Effects: The proposed project provides positive environmental effects. It reduces the current energy consumption by sixty-two (62%), effectively reducing the consumption of non-renewable fuel sources. The degrading of environmental standards would not make more efficient energy sources available.
- 8. Basis of Approval: Total energy requirements and alternative fuel sources have been considered and included in this appraisal or discarded as applicable.

DD FORM 1391 1 DEC 76 PREVIOUS EDITIONS MAY BE USED INTERNALLY
UNTIL EXHAUSTED

ENERGY SAVINGS OPPORTUNITY SURVEY FORT CAMPBELL, KENTUCKY ECO - 5 PROJECT SUMMARY INTERIOR/EXTERIOR LIGHTING

BUILDING NUMBER	BUILDING AREA	BASELINE ENERGY (MBTU)	ECO ENERGY (MBTU)	ENERGY SAVINGS (MBTU)	1ST YEAR SAVINGS	INVESTMENT COSTS	SPB (YR)	SIR
38 89 95 2745 3202 3204 3206 3207 3209 3307 3308 5207 5212 5661 5702 5740 6087 6088 6254 6302 6304 6306 6308 6390 6708 6713 6715 6717 6720 6723 6729 7510 7514 7541 7543 7562 7574	16,038 11,545 21,864 13,249 13,381 2,250 3,746 2,551 3,598 2,816 2,257 169,375 10,880 22,480 14,000 14,173 10,768 4,988 9,338 5,615 5,385 3,108 5,385 12,792 2,581 3,610 2,686 1,892 2,581 4,892 3,610 3,610 3,610 14,280 4,064 8,908 998 1,800 325	449 154 316 194 323 27 16 56 17 53 158 1841 57 393 90 26 742 174 201 59 60 77 91 212 57 49 44 177 32 127 52 45 327 307 42 51	195 60 119 58 103 10 5 20 11 23 142 778 20 165 41 10 243 59 153 18 17 29 30 95 24 21 22 58 14 41 19 20 132 1 117 6 2 0	254 94 197 136 220 17 11 36 6 30 16 1063 37 228 49 16 499 115 48 41 43 48 61 117 33 28 22 119 18 86 33 25 190 36 3 190 190 190 190 190 190 190 190 190 190	\$8,735 4,198 6,674 5,490 5,802 601 369 1,344 552 714 552 25,464 1,586 8,832 1,405 556 7,481 4,458 1,335 1,611 1,718 1,901 2,086 2,203 823 856 1,050 3,269 820 2,069 1,436 1,266 7,395 688 \$3,701 493 420 201	\$67,529 37,105 64,308 30,617 32,781 5,442 1,678 6,944 6,403 6,188 4,523 217,736 10,492 75,751 10,203 4,182 35,590 32,852 21,578 9,662 10,518 12,065 13,136 48,997 6,990 8,806 6,426 30,180 5,011 9,831 8,144 9,875 68,503 6,428 \$33,541 1,617 4,047 215	7.73 8.84 9.64 5.58 5.65 9.05 4.55 5.17 11.60 8.66 8.2 8.55 6.69 8.58 7.26 7.37 16.17 6.00 6.12 6.35 6.30 17.60 8.49 10.29 6.12 9.23 6.11 4.75 5.67 7.80 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.35 9.06 9.06 9.07 9.07 9.08 9.09 9.09 9.09 9.09 9.09 9.09 9.09	1.44 1.26 1.16 2.00 1.99 1.24 2.47 2.16 1.30 1.37 1.32 1.67 1.30 1.55 1.49 2.39 1.52 1.70 1.86 1.78 1.78 1.82 1.78 1.83 1.97 1.82 1.83 2.37 1.97 1.43 1.20 1.19 1.25 3.47 1.16 1.19
PIERCE VILLAGE	N/A	543	159	384	\$5,262	\$26,176	4.97	1.40
LAPOINTE VILLAGE	N/A	193	71	122	2,019	11,713	5.80	1.18
HAMMOND HEIGHTS	N/A	459	131	328	4,420	21,539	4.87	1.43
LEE VILLAGE	N/A	1,014	296	718	10,220	48,291	4.73	1.47
TOTALS	437,419	9,263	3,538	5,725	142,057	1,073,612	7.56	1.48

ENERGY SAVINGS OPPORTUNITY SURVEY FORT CAMPBELL, KENTUCKY ECO-5 PROJECT SUMMARY

PAGE 2 OF 2

BUILDING NUMBER	BASELINE ENERGY (MBTU)	ECO ENERGY (MBTU)	ENERGY SAVINGS (MBTU)	1ST YEAR SAVINGS	INVESTMENT COSTS	SPB (YR)	SIR
7541 7543 7562 7574	307 42 5 1	117 6 2 0	190 36 3	\$3,701 \$493 \$420 \$201	\$33,541 \$1,617 \$4,047 \$215	9.06 3.28 9.63 1.07	1.25 3.47 1.16 10.41
PIERCE VILLAGE	543	159	384	5262	26176	4.97	1.4
LAPOINTE VILLAGE	193	71	122	\$2,019	\$11,713	5.8	1.18
HAMMOND HEIGHTS	459	131	328	\$4,420	\$21,539	4.87	1.43
LEE VILLAGE	1,014	296	718	\$10,220	\$48,291	4.73	1.47
TOTALS	9,263	3,538	5,725	142,057	1,073,612	7.56	1.48

LIFE CYCLE COST ANALYSIS SUMMARY STUDY: ECOSTLT1 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.072

INSTALLATION & LOCATION: FT CAMPBELL REGION NOS. 4 CENSUS: 3

PHASE 1 LIGHTING PROJECT NO. & TITLE: 005-TLT1

FISCAL YEAR 1994 DISCRETE PORTION NAME: LIGHTING

ANALYSIS DATE: 10-07-93 ECONOMIC LIFE 15 YEARS PREPARED BY: KEITH DERRING

- 1. INVESTMENT
- A. CONSTRUCTION COST \$ 976010.
- C. DESIGN COST \$ 48801.
- 48801.
- D. TOTAL COST (1A+1B+1C) \$ 1073612.
- E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 0.
- F. PUBLIC UTILITY COMPANY REBATE \$ 0.
- \$ 1073612. G. TOTAL INVESTMENT (1D - 1E - 1F)
- 2. ENERGY SAVINGS (+) / COST (-)

DATE OF NISTIF	85-3273-X	USED FOR	DISCOUNT	FACTORS	OCT	1992

FUEL	UNIT COST \$/MBTU(1)	SAVINGS MBTU/YR(2)	NUAL \$ VINGS(3)	DISCOUNT FACTOR(4)	SCOUNTED VINGS(5)
A. ELECT	\$ 6.18	5725.	\$ 35381.	11.77	\$ 416429.
B. DIST	\$ 4.98	0.	\$ 0,	13.83	\$ 0.
C. RESID	\$.00	0.	\$ 0.	16.15	\$ 0.
D. NAT G	:	0.	\$ 0.	15.34	\$ 0.
E. COAL	\$.00	0.	\$ 0.	12.82	\$ 0.
F. PPG	\$.00	0.	\$ 0.	11.12	\$ 0.
M. DEMAN	D SAVINGS		\$ 59268.	11.12	\$ 659060.
N. TOTAL		5725.	\$ 94649.		\$ 1075489.

- 3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)

- 11.12 (1) DISCOUNT FACTOR (TABLE A)
- (2) DISCOUNTED SAVING/COST (3A X 3A1) 144382.
- B. NON RECURRING SAVINGS(+) / COSTS(-)

	ITEM REPLACE	SAVINGS(+) COST(-) (1) \$ 97834.	YR OC (2) 8	DISCNT FACTR (3) .73	DISCOUNTED SAVINGS(+)/ COST(-)(4) 71419. 292977.
2.	REPLACE INTERIOR	\$ 418539. \$ 516373	9	.70	364396

12984.

STUDY: ECO5TLT1 LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.072 REGION NOS. 4 CENSUS: 3 INSTALLATION & LOCATION: FT CAMPBELL PHASE 1 LIGHTING PROJECT NO. & TITLE: 005-TLT1 DISCRETE PORTION NAME: LIGHTING FISCAL YEAR 1994 ANALYSIS DATE: 10-07-93 ECONOMIC LIFE 15 YEARS PREPARED BY: KEITH DERRING C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+)/COST(-)(3A2+3Bd4)\$ 508778. 4. FIRST YEAR DOLLAR SAVINGS 2N3+3A+(3B1d/(YRS ECONOMIC LIFE))\$ 142057. 5. SIMPLE PAYBACK PERIOD (1G/4) 7.56 YEARS \$ 1584267. 6. TOTAL NET DISCOUNTED SAVINGS (2N5+3C) 7. SAVINGS TO INVESTMENT RATIO (SIR)=(5 / 1G)=1.48 (IF < 1 PROJECT DOES NOT QUALIFY) 6.73 % 8. ADJUSTED INTERNAL RATE OF RETURN (AIRR):

FORT CAMPBELL ENERGY SA ECO 6: INDOOR/OUTDOOR LIGHTING E	ELL ENERGY SAVINGS OPPORTUNITY SURVEY
BUILDING WIDE FLUORESC	BUILDING WIDE FLUORESCENT FIXTURE REPLACEMENT
BUILDING #: 38	
BUILDING USE: HOURS/DAY 10 DAYS/WEEK 7	ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEWAND CHARGE \$11.76 PER KW
EXISTING FIXTURE DATA	REPLACEMENT FIXTURE DATA
4 FOOT 144 I LAMP @ 48 W/FIXT = 6912 WATTS 0 I LAMP @ 37.8 W/FIXT = 542 LAMP @ 96 W/FIXT = 5184 WATTS	4 FOOT 144 1 LAMP @ 37 W/FIXT = 5328 WATTS 54 1 LAMP W/ 37 W/FIXT = 1998 WATTS
144 W/FbT = 113.4 W/FbT = 192 W/FbT = 151.2	FS 58 W/FIXT = 58 W/FIXT = 175
2 FOOT 0 1 LAMP @ 31 W/FIXT # 0 WATTS 0 4 LAMP @ 88 W/FIXT = 0 WATTS	2 FOOT 0.1 (AMP @ 24.W/FIXT = 0.WATTS 0.WATTS 0.2 (LAMP W/ 41.W/FIXT = 0.WATTS
0.2 LAMP U @ 96 W/FIXT = 0 WATTS 0.2 LAMP U @ 75.6 W/FIXT = 0 WATTS	HEFLECTORS 0.2 LAMP U@ 58 W/FDXT = 0.WATTS
8 FOOT 0.2 LAMP @ 180 W/FIXT = 0 WATTS 0.2 LAMP @ 168 W/FIXT = 0 WATTS	8 FOOT 01 LAMP W/ 58 W/FIXT = 0 WATTS REFLECTORS
TOTAL EXISTING KW 34.0	TOTAL REPLACEMENT KW 18.9
NET ENERGY SAVINGS 249.0 MBTU/YR	NET DOLLAR SAVINGS \$4,376.23

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1993
OCCUPANCY SENSOR UTILIZATION AFTER LIGHTING RETROFIT
IG #: 38 RESTROOMS ENSORS: 2
HR/DAY 10 DAY/WEEK 7 EST HR IN USE/DAY 5 WATTS 11.16
ENERGY SAVINGS 202 KWH
NET ENERGY SAVINGS 0.69 MBTU/YR NET DOLLAR SAVINGS \$4.27

FORT CAMPBELL EN	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1993
EXITS	EXIT SIGN REPLACEMENT - INCANDESCENT TO LED
BUILDING #: 38	
# EXIT SIGNS 4	ELECTRIC COSTS:
CURPENT WATTAGE 40	PENANT CHANGE 644 78 DEB KW
REPLACEMENT WATTAGE 3	
HOURS/YEAR 8760	
NET ENERGY SAVINGS 4	4.42 MBTU/YR NET DOLLAR SAVINGS \$48.33

TITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-5: BUILDING 38

Contract No: 27-93-C-0096

Prepared By: Systems Corp Estimator: Keith λ. Derrington Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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PROJECT ID: 0038E5

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U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

TIME 09:08:59

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BUILDING TO THE 5 FOOT LINE

AA. ELECTRICAL

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ETAILED ESTINATE

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 09:08:59

DETAIL PAGE 1

							BASE BID
DIVISION 16 ELECTRICAL	QUANTITY DON CREW	MANER	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING 16512 7000 FLUORESCENT - RECESSED T8 ELEC	CTRONIC BALLAST						
CD=3 EL 7001 4 FT 1 LAMP PARABOLIC LOUVRE WC=1100	*** UNIT COSTS: *** 144.00 EA EELEB	0.57 82	18.86 2,716	0.07 11		5.26 758	
CD=3 EL 7002 4 PT 1 LAMP PARABOLIC LOUVRE W/ WC=1100 REFLECTOR	*** UNIT COSTS: *** 54.00 EA EELEB	0.54 29	17.84 964	0.07 4	122.00 6,588		146.01 7,885
CD=3 EL 7003 4 FT 2 LAMP PARABOLIC LOUVRE W/ WC=1100 REFLECTOR	*** UNIT COSTS: *** 114.00 EA EELEB	0.59 67	19.42 2,214	0.08	136.00 15,504	6.80 775	
16530 1100 SURFACE OR PENDANT MOUNTED							
CD=3 EL 1118 LED EXIT SIGN W/ BATTERY WC=1100	*** UNIT COSTS: *** 4.00 EA EELEA	1.25 5	41.26 165	0.00	121.45 486	6.07 24	168.79 675
16900 CONTROLS AND INSTRUMENTATION 16930 3000 OCCUPANCY SENSORS							
CD=3 EL 3001 OCCUPANCY SENSOR, 1800 W MAX WC=1100	*** UNIT COSTS: *** 2.00 EA EELEB	0.50 1	16.51 33	0.06	48.00 96		66.97 134
TOTAL DIVISION 16 ELECTRICAL		185	6,091	23	37,830	1,891	45,836
TOTAL FACILITY AA. ELECTRICAL		185	6,091	23	37,830	1,891	45,836
TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE				23			
TOTAL BASE BID	•			23			45,836
TOTAL ADDITIVE		0		0.			
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY	•	185	6,091	23	37,830	1,891	45,836

* * * END OF DETAIL REPORT * * *

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: 0038E5

Thu 26 Aug 1993

OJECT NOTES

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

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PROJECT NOTES

ECO-5: INTERIOR LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN SELECTED FACILITIES AT FT CAMPBELL.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0038E5

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

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ITEH AND FACILITY SUHHARY

ECO-5: BUILDING 38

SUMMARY PAGE

BID ITEM 1 BUILDING T	O THE 5 FOOT LI	INE							BASE BID
ID FACILITY	CC	OST TO PRH	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	45,836	10.0 % 4,584	0.0	7.5 \ 3,781	2.5 \ 1,355	0.0	55,556	55555.99
BID ITEM TOTAL	1.00 EA	45,836	4,584	0	3,781	1,355	0	55,556	55555.99
TOTAL BASE BID	-	45,836	4,584	0	3,781	1,355	0	55,556	
TOTAL ADDITIVE		0	0	0	0	0	. 0.	0	
TOTAL INCL ADD	•	45,836	4,584	0	3,781	1,355	0	55,556	

CURRENCY in DOLLARS

PROJECT ID: 0038E5 4-37

ROJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

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	ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST	
	1. BUILDING TO THE 5 FOOT LINE	1.00 EA	55,556		55,556	55556.00	
	TOTAL CURRENT CONTRACT COST		55,556	0	55,556		
·	Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0		
	ESCALATED CONTRACT COST		55,556	0	55,556		
	Government-Furnished Property		0		0		
	SUBTOTAL		55,556	0	55,556		
	Contingencies	10.0	5,556	0	5,556		
	SUBTOTAL	-	61,112	0	61,112		
	SIOH (S&A)	5.5	3,361	0	3,361		
	CURRENT WORKING ESTIMATE	-	64,473	0	64,473		
	Estimated Construction Time	365 Days					

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0038E5

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

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SUMHARY PAGE

ONTRACTOR DIRECT SUMMARY

ECO-5: BUILDING 38

ID	CONTRACTOR	PH	QUANTITY U	OM	KANERS			HAT W/TX	TOTAL DI AHOUNT			SUBCON W/OH&P	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00 E	l).	185	6,091	23	39,721	45,836	100.0	ŧ		0	45,836
	TOTAL DIRECT				185	6,091	23	39,721	 45,836	100.0	ŧ			

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

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SUMMARY PAGE

ONTRACTOR INDIRECT SUMMARY

ECO-5: BUILDING 38

		CT HOFC:	AMOUNT PC	T BOND OTHRE	AMOUNT PCT UNIT COST
AA GENERAL/PRIME 45,836 TOTAL OVERHEAD & PROFIT	4,584 10.4 4,584 10.4		3,781 7. 3,781 7.	5 2.5 0.0	55,556 100.0\$ 55555.99

PROJECT ID: 0038E5 4-40

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

TIME 09:08:59

SUMMARY PAGE

I	DIVISION	SUMMARY

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT			**** TOTAL * DIRECT
16 ELECTRICAL	185	6,091	23	37,830	1,891	45,836
TOTAL DIRECT	185	6,091	23	37,830	1,891	45,836

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0038E5

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

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STEMS SUMMARY

					**:	** TOTAL *	
ID SYSTEM	MANHOURS	LABOR	EQUIPMENT	MATERIAL	SALES TAX	DIRECT	
11 INTERIOR ELECTRICAL	185	6,091	23	37,830	1,891	45,836	
TOTAL DIRECT	185	6,091	23	37,830	1,891	45,836	

IPHENT SUHHARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

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SUMMARY PAGE

EQUIP	DESCRIPTION	LIFE HRS			BOOK OP - EXPENSE	- HRLY RATE		**** TOT.	AL **** COST
ENI20	SMALL TOOLS					1.40	1.40	17	23
TOTAL	PROJECT EQUIPMENT HOURS							17	23

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0038E5

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 38

TIME 09:08:59

SUMMARY PAGE

BOR SUMMARY

 CRAFT	DESCRIPTION	BASE	OVERTH	TXS/INS	FRNG	TRVL				COST
LELEC	ELECTRICIANS	20.50	0.0	24.0%	7.49	0.00	32.91	25.79	185	6,091
TOTAL	PROJECT HANHOURS								185	6,091

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0038E5

URVEY S PAGE 1 OF 3					0 WATTS	5439 WATTS	0 WATTS	1044 WATTS	S. WATTE	0 WATTS	0 WATTS	0 WATTS	6.5	\$2,115,32
RTUNITY S	ENT		\$0.0211 PER KWH \$11.78 PER KW	URE DATA	37_W/FIXT =	37 W/FIXT =	58 W/FIXT =	58 W/FIXT =	A. S. LUMENAT	41 W/FIXT =	58 W/FIXT =	OT 0.1 LAMP W/ 58 W/FIXT =	TOTAL REPLACEMENT KW	NET DOLLAR SAVINGS
CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS PAGES 131 AUGUST 1993	BUILDING WIDE FLUORESCENT FIXTURE REPLACEMENT		ELECTRIC COSTS: ENERGY CHARGE DEMAND CHARGE	REPLACEMENT FIXTURE DATA	4 FOOT 37 W/FIXT =	147 1 LAMP W/	0.2 LAMP W/	18 2 LAMP W/ REFLECTORS	2 FOOT	02 LAMP W/	02 LAMP U @	8 FOOT 0.1 LAMP W/ REFLECTORS	TOTAL REPL	NET DOLLA
JERGY SAVII	VIDE FLUORESCENT				σ,	0 O G	ວຸທຸດ	ຂອ	(QΩ	S	પ્ર પ્		υγк
	BUILDING					= 14112 WATTS		= 0.0 WALLS = 3456 WATTS = 0.0 WATTS		= 0 WATTS	= 0.WATTS	= 0 WATTS	17.	88,5 MBTU/YR
FORT CAMPB ECO 5: IND		69	တ တ	JE DATA		3/.8 W/FIXT 96 W/FIXT		193.4 W/FIXT = 151.2 W/FIXT =	***	31 W/FIX1 = 88 W/FIXT =	02 LAMP U @ 96 W/FIXT = 02 LAMP U @ 75.6 W/FIXT =	= 180 W/FIXT = 168 W/FIXT =	=	NET ENERGY SAVINGS
FORT		BUILDING #:	BUILDING USE: HOURS/DAY DAYS/WEEK	EXISTING FIXTURE DATA	4 FOOT	147.2 LAMP @	0.3 LAMP @	03 LAMP @ 18 4 LAMP @ 0 4 LAMP @	2 FOOT	04 LAMP @	0.2 LAMP U.6 0.2 LAMP U.6	8 FOOT 0 2 LAMP @	TOTALEX	NET ENE

SAMPBELL CO 5: INDOOR/OI BU B1 B2 C1 - YES, 2 - NO 25 WATTS = 40 WATTS = 40 WATTS = 60 WATTS	L ENERGY SAVINGS OPPORTUNITY SURVEY OUTDOOR LIGHTING FEFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1993 BUILDING WIDE INCANDESCENT LAMP REPLACEMENT ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$0.00 PE
90 100 XISTING	0 LAMPS @ 26 WATTS = 0 WATTS TOTAL REPLACEMENT WATTS 13
NET ENERGY SAVINGS 0.12 MBTU/YR	NET DOLLAR SAVINGS \$0.77

FORT CAMPBE ECO 5: INDOC	CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECOS: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS	Y SURVEY EVELS PAGE 3 OF 3
	EXIT SIGN REPLACEMENT - INCANDESCENT TO LED	
BUILDING #: 89	69	
# EXIT SIGNS	ELECTRIC COSTS:	2
CURPENT WATTAGE	40 AND CLARACT AND	אאר אי
REPLACEMENT WATTAGE	CE 3	ALV C
HOURS/YEAR	9760	
NET ENERG	NET ENERGY SAVINGS 5,52 MBTU/YR NET DOLLAR SAVINGS	NGS \$60.41

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-5: BUILDING 89

Contract No: 27-93-C-0096

Prepared By: Systems Corp Estimator: Keith A. Derrington Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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PROJECT ID: 0089E5 4-48

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:02

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BUILDING TO THE 5 FOOT LINE

AA. ELECTRICAL.

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ETAILED ESTIMATE

U.S. ARMY CORPS of ENGINEERS M-CACES
ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-5: BUILDING 89

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 09:37:02

DETAIL PAGE 1

BASE BID QUANTITY UON CREW MANHR LABOR EQUIPMENT MATERIAL SALESTX DIRECT \$ DIVISION 16 ELECTRICAL 16500 LIGHTING 16512 6100 SMALL FL FIXTURES (LESS THAN 40 WATT LAMPS) CD=3 EL 6105 SURF SQ W/1 13W BIAXIAL FL LAMP *** UNIT COSTS: *** 1.25 41.26 0.00 27.80 1.39 70.45 WC=1100 WHITE ACRYLIC LENS 1.00 EA EELEA 1 41 0 28 1 70 16512 7000 FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST CD=3 EL 7002 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 17.84 0.07 122.00 6.10 146.01 WC=1100 REFLECTOR 147.00 EA EELEB 79 2,623 10 17,934 897 21,464 CD=3 EL 7003 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 19.42 0.08 WC=1100 REFLECTOR 18.00 EA EELEB 11 350 1 0.08 136.00 6.80 162.29 2,448 122 2,921 16530 1100 SURFACE OR PENDANT MOUNTED *** UNIT COSTS: *** 1.25 41.26 0.00 121.45 6.07 168.79 5.00 EA EELEA 6 206 0 607 30 844 CD=3 EL 1118 LED EXIT SIGN W/ BATTERY WC=1100 TOTAL DIVISION 16 ELECTRICAL 98 3,220 12 21,017 1,051 TOTAL FACILITY AA. ELECTRICAL 3,220 12 21,017 1,051 25,300 TOTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE 3,220 12 21,017 1,051 TOTAL BASE BID 98 3,220 12 21,017 1,051 25,300 0 0 0 0 0 0 TOTAL ADDITIVE TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY 98 3,220 12 21,017 1,051 25,300

* * * END OF DETAIL REPORT * * *

POJECT NOTES

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:02

SUMMARY PAGE 1

PROJECT NOTES

ECO-5: INTERIOR LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN

SELECTED FACILITIES AT FT CAMPBELL.

TOTAL BASE BID

TOTAL ADDITIVE

TOTAL INCL ADD

U.S. ARMY CORPS of ENGINEERS N-CACES

TIME 09:37:02 ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

748

0

748

NID ITEM AND FACILITY SUHMARY

ECO-5: BUILDING 89

SUMMARY PAGE

30,665

30,665

0

0

0

BID	ITEM	1	BUILDING	TO :	THE 5	FOOT	LINE							BASE BID
ID	FACILI	TY					COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTR	ΙCλ	, L		1.0	00 Ελ	25,300	10.0% 2,530	0.0 \$ 0	7.5 % 2,087	2.5 % 748	0.0\$	30,665	30664.66
BID	ITEN T	OTAI			1.0	00 EX	25,300	2,530	0	2,087	748	0	30,665	30664.66

25,300 2,530 0 2,087

0

0

0

2,087

0

2,530

0

25,300

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:02

SUMMARY PAGE 3

PROJECT CWE SUNHARY

ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	30,665		30,665	30664.70
TOTAL CURRENT CONTRACT COST		30,665	0	30,665	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST	-	30,665	0	30,665	
Government-Furnished Property		0		0	
SUBTOTAL	•	30,665	0	30,665	
Contingencies	10.0%	3,066	0	3,066	
SUBTOTAL	•	33,731	0	33,731	٠
SIOH (S&A)	5.0%	1,687	0	1,687	
CURRENT WORKING ESTINATE	-	35,418	0	35,418	•
Estimated Construction Time	365 Days			•	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0089E5 4-53

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:02

SUMMARY PAGE

MYTRA	CTOR	DIRECT	SUNHARY

ID	CONTRACTOR	PH	QUANTITY	UON	HANERS			MAT W/TX	* TOTAL DI AMOUNT		* SUBCON W/OH&P	*	SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	98	3,220	12	22,068	25,300	100.0		0	25,300
	TOTAL DIRECT				98	3,220	12	22,068	25,300	100.0			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0089E5 4-54

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:0.

SUMMARY PAGE

ONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PM	SUBTOTAL		OVERHEA AMOUNT	_		PROFIT AMOUNT			* TOTAL AHOUNT		UNIT COS
λλ	GENERAL/PRIME TOTAL OVERHEAD & PROFIT		25,300	****	2,530 2,530			2,087	 2.5	0.0%	30,665	100.0%	30664.60

CSI DIVISION SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:01

SUMMARY PAGE

ID CSI DIVISION	KANHOURS	LABOR		MATERIAL		* TOTAL * DIRECT
16 ELECTRICAL	98	3,220	_ 12	21,017	1,051	25,300
TOTAL DIRECT	98	3,220	12	21,017	1,051	25,300

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0089E5 4-56

STEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:02

SUMMARY PAGE 7

					##:	*** TOTAL *
ID SYSTEM	MANHOURS	LABOR	EQUIPMENT			DIRECT
11 INTERIOR ELECTRICAL	98	3,220	12	21,017	1,051	25,300
TOTAL DIRECT	98	3,220	12	21,017	1,051	25,300

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0089E5

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:01

SUMMARY PAGE

EQUIPHENT SUNNARY

EQUIP DESCRIPTION	LIFE HRS TL HRL	VALUE *** AI Y OWNRSHP O		HRLY RATE			AL ****
ENI20 SHALL TOOLS				1.40	1.40	8	11
TOTAL PROJECT EQUIPMENT HOURS						8	12

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 89

TIME 09:37:01

SUMMARY PAGE

ABOR SUMMARY

CRAFT DI	ESCRIPTION	Base	OVERTH	TXS/INS	FRNG	TRVL				**** COST
LELEC E	LECTRICIANS	20.50	0.0\$	24.0	7.49	0.00	32.91	25.79	98	3,220
TOTAL PRO	DJECT MANHOURS								98	3,220

* * * END OF SUMMARY REPORT * * *

FORT CAMPBEL	L ENERGY SAVI	LL ENERGY SAVINGS OPPORTUNITY SURVEY R/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 81 AUGUST 1993 PAGE 1 OF 2
	BUILDING WIDE FLUORESCENT FIXTURE REPLACEMENT	T FIXTURE REPLACEMENT
BUILDING #: 95		
BUILDING USE: 10 HOURS/DAY 10 DAYS/WEEK 5		ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$11.78 PER KW
EXISTING FIXTURE DATA		REPLACEMENT FIXTURE DATA
	o WATTS	4 FOOT 0.1 LAMP @ 37 W/FIXT = 0.WATTS
	13920 WATTS	145 1 LAWP W/ 37 W/FIXT = 5365 WATTS
03 LAMP @ 75.6 W/F.KT = 03 LAMP @ 113.4 W/F.KT = 17 4 LAMP @ 192 W/F.KT = 12.4 LAMP @ 192 W/F.KT = 12.4 LAMP @ 151.2 W/F.KT = 12.4 LAMP @ 12.4 L	0 WALLS 0 WALTS 3264 WATTS 48205 WATTS	0.2 LAMP W/ 58 W/FXT ≈ 0 WATTS PEFLECTORS
	10530.	2 FOOT
0 1 LAMP @ 31 W/FIXT = 0 4 LAMP @ 88 W/FIXT = -	0 WATTS 0 WATTS	02 LAMP @ 24 W/FXT = 0 WATTS 02 LAMP W/ 41 W/FXT = 0 WATTS
0.2 LAMP U @ 96 W/FIXT = 0.2 LAMP U @ 75.6 W/FIXT =	0 WATTS 0 WATTS	02 LAMP U @ 58 W/FXT = 0 WATTS
8 FOOT 0 2 LAMP @ 180 W/FIXT = 0 2 LAMP @ 168 W/FIXT =	0 WATTS 0 WATTS	8 FOOT 0 1 LAWP W/ 58 W/FXCT = 0 WATTS REFLECTORS
TOTAL EXISTING KW	35.5	TOTAL REPLACEMENT KW 13.4
NET ENERGY SAVINGS	196.1 MBTU/YR	NET DOLLAR SAVINGS \$4,340.76

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY	INGS OPPORTUNITY SURVEY
ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1993	ICIENCIES TO RECOMMENDED LEVELS PAGE 2 OF 2
BUILDING WIDE INCANDESCENT LAMP REPLACEMENT	ENT LAMP REPLACEMENT
BUILDING #: 95	
LAMP USE: HOURS/DAY 10 DAYS/WEEK 5 PEAK USE 1 (1-YES, 2-NO)	ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$11.78 PER KW
EXISTING INCANDESCENTS 0 LAMPS @ 25 WATTS = 0 WATTS 4 LAMPS @ 40 WATTS = 160 WATTS 0 LAMPS @ 52 WATTS = 0 WATTS 0 LAMPS @ 60 WATTS = 0 WATTS 0 LAMPS @ 90 WATTS = 0 WATTS 0 LAMPS @ 100 WATTS = 0 WATTS 10 LAMPS @ 100 WATTS = 0 WATTS	COMPACT FLUORESCENT REPLACEMENT 0 LAMPS @ 7 WATTS = 0 WATTS 4 LAMPS @ 9 WATTS = 36 WATTS 0 LAMPS @ 18 WATTS = 0 WATTS 0 LAMPS @ 26 WATTS = 0 WATTS TOTAL REPLACEMENT WATTS 36
NET ENERGY SAVINGS 1.10 MBTU/YR	NET DOLLAR SAVINGS \$24.34

TLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-5: BUILDING 95

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

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PROJECT CWE SUMMARY.

CONTRACTOR DIRECT SUMMARY.

CONTRACTOR INDIRECT SUMMARY.

CSI DIVISION SUMMARY.

SYSTEMS SUMMARY.

EQUIPMENT SUMMARY.

DETAILED ESTIMATE

1. BUILDING TO THE 5 FOOT LINE

AA. ELECTRICAL.

1. BUILDING TO THE 5 FOOT LINE

* * * END TABLE OF CONTENTS * * *

ETAILED ESTINATE

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

TIME 10:00:53

DETAIL PAGE 1

BASE BID

						DEDU DIL
DIVISION 16 ELECTRICAL QUANTITY UON	CREW MANE	R LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
16500 LIGHTING 16512 6100 SMALL FL FIXTURES (LESS THAN 40 WATT LAMPS)						
CD=3 EL 6104 SURF SQ W/1 9W BIAXIAL FL LAMP *** UNIT COSTS WC=1100 WHITE ACRYLIC LENS 4.00 EA	: *** 1.2 EELEA	5 41.26 5 165	0.00	27.50 110		70.14 281
16512 7000 FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST	,					
CD=3 EL 7002 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS WC=1100 REFLECTOR 145.00 EA	: *** 0.5 EELEB 7	4 17.84 8 2,587		122.00 17,690		146.01 21,172
CD=3 EL 7003 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS WC=1100 REFLECTOR 138.00 EA	: *** 0.5 EELEB 8	9 19.42 1 2,680	0.08		6.80 938	162.29 22,397
TOTAL DIVISION 16 ELECTRICAL	16	5 5,432	21	36,568	1,828	43,849
TOTAL FACILITY AA. ELECTRICAL	16	5 5,432	21	36,568	1,828	43,849
OTAL BID ITEM 1. BUILDING TO THE 5 FOOT LINE	16	5 5,432	21	36,568	1,828	43,849
TOTAL BASE BID	16	5 5,432	21	36,568	1,828	43,849
TOTAL ADDITIVE		0 0	. 0	0	0	0
TOTAL INCL ADD ENERGY SAVINGS OPPORTUNITY SURVY	16	5 5,432	21	36,568	1,828	43,849

* * * END OF DETAIL REPORT * * *

PROJECT NOTES

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

SUMMARY PAGE 1

PROJECT NOTES

ECO-5: INTERIOR LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN SELECTED FACILITIES AT FT CAMPBELL.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0095E5

TOTAL INCL ADD

U.S. ARMY CORPS of ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-5: BUILDING 95

BID ITEM AND FACILITY SUMMARY

SUMMARY PAGE

TIME 10:00:5

BI	D ITEM 1 BU	ILDING TO THE 5 FO	OT LINE							BASE BII
II	FACILITY		COST TO PRH	OVERHEAD	HONE OPC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTRICAL	1.00	EA 43,849	10.0\$ 4,385	0.0	7.5% 3,618	2.5 \$ 1,296	0.0	53,148	53147.6 t
BI	D ITEM TOTAL	1.00	EA 43,849	4,385	0	3,618	1,296	0	53,148	53147.60
TO	TAL BASE BID		43,849	4,385	0	3,618	1,296	0	53,148	
TO	TAL ADDITIVE		0	. 0	0	0	0	0	0	

43,849 4,385 0 3,618 1,296 0 53,148

ROJECT CWE SUHHARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:5

SUMMARY PAGE

 ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	53,148		53,148	53147.70
TOTAL CURRENT CONTRACT COST		53,148	0	53,148	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST	•	53,148	0	53,148	
Government-Furnished Property		0		0	
SUBTOTAL	•	53,148	0	53,148	
Contingencies	10.0%	5,315	0	5,315	
SUBTOTAL	•	58,462	0	58,462	
SIOH (S&A)	5.0%	2,923	0	2,923	
CURRENT WORKING ESTIMATE		61,386	0	61,386	
Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0095E5

CONTRACTOR DIRECT SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

SUMMARY PAGE

ID	CONTRACTOR	PM	QUANTITY	UON	HANHRS		EQUIPMENT				* *	SUBCON W/OH&P		SUBTOTAL
λλ	GENERAL/PRIME		1.00	Ελ	165	5,432	21	38,396	43,849	100.0	ł		0	43,849
	TOTAL DIRECT				165	5,432	21	38,396	 43,849	100.0	ŧ			

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0095E5

U.S. ARMY CORPS OF ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:5

SUMMARY PAGE :

CONTRACTOR INDIRECT SUMMARY

ID	CONTRACTOR	PH	SUBTOTAL	 EAD *** I PCT					****** TOTA ANOUNT		CT ****** UNIT COST
λλ	GENERAL/PRIME TOTAL OVERHEAD & PROFIT		43,849	 5 10.0		618 618	 2.5	0.0	53,148	100.01	53147.65

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

CSI DIVISION SUMMARY

SUMMARY PAGE

-	ID CSI DIVISION	MANHOURS	LABOR			SALES TAX	DIRECT	
-	16 ELECTRICAL	165	5,432	21	36,568	1,828	43,849	
	TOTAL DIRECT	165	5,432	21	36,568	1,828	43,849	

YSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

SUMMARY PAGE

•					++	*** TOTAL *	
 ID SYSTEM	MANHOURS	LABOR	EQUIPMENT			DIRECT	
 11 INTERIOR ELECTRICAL	165	5,432	21	36,568	1,828	43,849	
TOTAL DIRECT	165	5.432	21	36,568	1,828	43,849	

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

TIME 10:00:53

ECO-5: BUILDING 95 SUMMARY PAGE &

EQUIP DESCRIPTION	LIFE HRS TL HRLY OWNRSHP		
ENI20 SHALL TOOLS		 1.40	1.40 15 21
TOTAL PROJECT EQUIPMENT HOURS		2	15 21

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0095E5 4-72

ABOR SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 95

TIME 10:00:53

SUMMARY PAGE 9

CRAFT	DESCRIPTION	Base	OVERTN	TXS/INS		TRVL				****COST
LELEC	ELECTRICIANS	20.50	0.0	24.0	7.49	0.00	32.91	25.79	165	5,432
TOTAL	PROJECT MANHOURS								165	5,432

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 0095E5

CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO.S: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS PAGE 1 OF 4	BUILDING WIDE FLUORESCENT FIXTURE REPLACEMENT		ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$11.76 PER KW	REPLACEMENT FIXTURE DATA	4 FOOT 21 LAMP @ 37 W/FIXT = 74 WATTS 71 LAMP W/ 37 W/FIXT = 259 WATTS	#EFLECTORS	2 FOOT 01 LAMP @ 24 W/FIXT = 0 WATTS 02 LAMP W/ 41 W/FIXT = 0 WATTS	02 LAMP U @ 58 W/FXT = 0 WATTS	8 FOOT 0.1 LAMP W/ 58 W/FIXT = 0 WATTS REFLECTORS	TOTAL REPLACEMENT KW 6.8	NET DOLLAR SAVINGS \$2,910,31
FORT CAMPBELL ENERGY S. ECO.S: INDOOR/OUTDOOR LIGHTING	BUILDING WIDE FLUOR	BUILDING #: 2745	BUILDING USE: 9 HOURS/DAY 9 DAYS/WEEK 5	EXISTING FIXTURE DATA	48 W/FIXT = 9 37.8 W/FIXT = 67 96 W/FIXT = 67	0.2 LAMP @ 75.6 W/FIXT = 0 WATTS 4.3 LAMP @ 144 W/FIXT = 576 WATTS 108 4 LAMP @ 192 W/FIXT = 20736 WATTS 0.4 LAMP @ 151.2 W/FIXT = 0 WATTS	2 FOOT 0 1 LAMP @ 31 W/FIXT ≈ 0 WATTS 0 4 LAMP @ 68 W/FIXT ≈ 0 WATTS	0.2 LAMP U @ 96 W/FXT = 0 WATTS 0.2 LAMP U @ 75.6 W/FXT = 0 WATTS	8 FOOT 0.2 LAMP @ 180 W/FIXT = 0 WATTS 0.2 LAMP @ 166 W/FIXT = 0 WATTS	TOTAL EXISTING KW 22.1	NET ENERGY SAVINGS 121,8 MBTU/YR

PAGE 2 OF 4 CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY NET DOLLAR SAVINGS \$12.91 ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS
31 AUGUST 1993 ELECTRIC COSTS:
ENERGY CHARGE \$0.0211 PER KWH
DEMAND CHARGE \$11.78 PER KW OCCUPANCY SENSOR UTILIZATION AFTER LIGHTING RETROFIT 2.08 MBTU/YR **NET ENERGY SAVINGS** RESTROOMS 611 KWH 9 5 4.5 522 2745 DAY/WEEK EST HR IN USE/DAY **ENERGY SAVINGS** # OF SENSORS: FORT BUILDING #: HR/DAY WATTS

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1993	BUILDING WIDE INCANDESCENT LAMP REPLACEMENT		ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$11.78 PER KW	EMEI III	NET DOLLAR SAVINGS \$26.91
FORT CAMPBELL ENERGY SA ECO 5: INDOOR/OUTDOOR LIGHTING E 31 AUGUST 1993	BUILDING WIDE IN	BUILDING #: 2745	LAMP USE: HOURS/DAY DAYS/WEEK FEAK USE 1 (1-YES, 2-NO)		NET ENERGY SAVINGS 1.12 MBTU/YR

FORT CAM	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 6: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 81 AUGUST 1883 PAGE 1 OF 1
	EXIT SIGN REPLACEMENT - INCANDESCENT TO LED
BUILDING #: 2745	
# EXIT SIGNS	10 ELECTRIC COSTS:
CURRENT WATTAGE	40
REPLACEMENT WATTAGE	3
HOURS/YEAR 8	8760
NET ENERGY SAVINGS	SAVINGS 11,0 MBTU/YR NET DOLLAR SAVINGS \$120.82

ITLE PAGE

ENERGY SAVINGS OPPORTUNITY SURVY PT CAMPBELL, KY ECO-5: BUILDING 2745

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:3.

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* * * END TABLE OF CONTENTS * * *

AA. ELECTRICAL.....

Thu 26 Aug 1993
ETAILED ESTINATE

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

DETAIL PAGE 1

TIME 10:18:31

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BIT

								DYDE DII
DIVISION 16 ELECT	TRICAL	QUANTITY DON CREW	KANER	LABOR	EQUIPHENT	MATERIAL	SALESTX	DIRECT S
16500 LIGHTING 16512 6100 SM/	ALL FL FIXTURES (LESS THAN 40 WA	TT LAMPS)						
CD=3 EL 6105 S WC=1100 V	SURF SQ W/1 13W BIAXIAL FL LAMP WHITE ACRYLIC LENS	*** UNIT COSTS: *** 3.00 EA EELEA	1.25 4	41.26 124	0.00	27.80 83	1.39	70.45 211
16512 7000	FLUORESCENT - RECESSED T8 ELEC	TRONIC BALLAST						
CD=3 EL 7001 4 WC=1100	FT 1 LAMP PARABOLIC LOUVRE	*** UNIT COSTS: *** 2.00 EA EELEB		18.86 38	0.07	105.25 211		129.45 259
	FT 1 LAMP PARABOLIC LOUVRE W/	*** UNIT COSTS: *** 7.00 EA EELEB		17.84 125	0.07 0	122.00 854		146.01 1,022
	FT 2 LAMP PARABOLIC LOUVRE W/	*** UNIT COSTS: *** 112.00 EA EELEB	0.59 66	19.42 2,175	0.08 8	136.00 15,232	6.80 762	162.29 18,177
16530 1100 8	SURFACE OR PENDANT HOUNTED							
CD=3 EL 1118 I WC=1100	ED EXIT SIGN W/ BATTERY	*** UNIT COSTS: *** 10.00 EA EELEA	1.25 13	41.26 413.	0.00	121.45 1,215	6.07 61	168.79 1,688
	ND INSTRUMENTATION OCCUPANCY SENSORS							
CD=3 EL 3001 C WC=1100	CCUPANCY SENSOR, 1800 W HAX	*** UNIT COSTS: *** 3.00 EA EELEB	0.50	16.51 50	0.06	48.00 144	2.40 7	66.97 201
TOTAL DIVISION 16	ELECTRICAL				9			21,558
TOTAL FACILITY AA	. ELECTRICAL		89		9			
TOTAL BID ITEM 1	. BUILDING TO THE 5 FOOT LINE		89		9			21,558
TOTAL BASE BID			89	2,923	9	17,738	887	21,558
TOTAL ADDITIVE			0	0	0	0	0	0
TOTAL INCL ADD EN	ERGY SAVINGS OPPORTUNITY SURVY		89	2,923	9	17,738	887	21,558
		1						

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5 4-80

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE]

PROJECT NOTES

ECO-5: INTERIOR LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN

SELECTED FACILITIES AT FT CAMPBELL.

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5 4-81

D ITEM AND FACILITY SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

ECO-5: BUILDING 2745

SUNDARY PAGE

TIME 10:18:31

BID ITEM 1 BUILDING	TO THE 5 FOOT L	INE							BASE BID
ID FACILITY	O	OST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
AA ELECTRICAL	1.00 EA	21,558	10.01	0.0	7.5 \ 1,779	2.5 t 637	0.0	26,130	26129.63
BID ITEM TOTAL	1.00 Ελ	21,558	2,156	0	1,779	637	0	26,130	26129.63
TOTAL BASE BID	·	21,558	2,156	0	1,779	637	0	26,130	
TOTAL ADDITIVE	•	0	0	0	0	0	0	0	
TOTAL INCL ADD		21,558	2,156	0	1,779	637	0	26,130	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5 4-82

ROJECT CWE SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE

 ID BID ITEM	NOU YTITMAUQ	base bid	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	26,130		26,130	26129.60
TOTAL CURRENT CONTRACT COST	-	26,130	0	26,130	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0\$	0	0	0	
ESCALATED CONTRACT COST		26,130	0	26,130	•
Government-Furnished Property		0		0	
SUBTOTAL	-	26,130	0	26,130	
Contingencies	10.0%	2,613	. 0	2,613	
SUBTOTAL	•	28,743	0	28,743	
SIOH (S&A)	5.0%	1,437	0	1,437	
CURRENT WORKING ESTIMATE	-	30,180	0	30,180	
Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

NTRACTOR DIRECT SUMMARY

SUMMARY PAGE

ID	CONTRACTOR	PN	QUANTITY	DON	MANERS		EQUIPMENT				* SUBCON W/OH&P		SUBTOTAL
λλ	GENERAL/PRIME		1.00	Eλ	89	2,923	9	18,625	21,558	100.0		0	21,558
	TOTAL DIRECT				89	2,923	9	18,625	21,558	100.0			

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

SUMMARY PAGE 5

TIME 10:18:31

CONTRACTOR INDIRECT SUMMARY

*** OVERHEAD *** ---- **** PROFIT ****

ID CONTRACTOR PM SUBTOTAL AHOUNT PCT HOFC: AHOUNT PCT BOND: OTHR: AMOUNT PCT UNIT COST

AA GENERAL/PRIME 21,558 2,156 10.0: 0.0 1,779 7.5: 2.5: 0.0: 26,130 100.0: 26129.62

TOTAL OVERHEAD & PROFIT 2,156 10.0: 1,779 7.5:

SI DIVISION SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE

 					±±	*** TOTAL *	
ID CSI DIVISION	MANHOURS	LABOR	EQUIPHENT	HATERIAL	SALES TAX	DIRECT	
16 ELECTRICAL	89	2,923	9	17,738	887	21,558	
TOTAL DIRECT	89	2,923	9	17,738	887	21,558	

CURRENCY in DOLLARS

CREW ID: ORL290

PROJECT ID: 2745E5

STEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE

ID SYSTEM	MANHOURS	LABOR		MATERIAL		** TOTAL * DIRECT
11 INTERIOR ELECTRICAL	89	2,923	9	17,738	887	21,558
TOTAL DIRECT	89	2,923	9	17,738	887	21,558

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5 4-87

QUIPHENT SUHMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE

		*										
EQUIP	DESCRIPTION	LIFE HRS	TL HRLY	OWNRSHP	OWNS O	NTY	OWNRSHP	EXPENSE	RATE	RATE	HOURS	rzoo
	######################################											
ENI20	SMALL TOOLS								1.40	1.40	7	9
ጥረም እ ፣	DRATECT FOILTPMENT HOURS										7	Ċ

Thu 26 Aug 1993

ABOR SUHHARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 2745

TIME 10:18:31

SUMMARY PAGE

CRAFT DI	SCRIPTION	Base	OVERTH	TXS/INS	FRNG	TRVL				****COST
LELEC EI	ECTRICIANS	20.50	0.0	24.0%	7.49	0.00	32.91	25.79	89	2,923
TOTAL PRO	JECT HANHOURS								89	2,923

* * * END OF SUMMARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 2745E5

FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SI	LL ENERGY SAVINGS OPPORTUNITY SURVEY DR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS PAGE 1 0F 2 1 AUGUST 1993
BUILDING WIDE FLUORESCENT FIXTURE REPLACEMENT	FIXTURE REPLACEMENT
BUILDING #: 3202	
BUILDING USE: 10 HOURS/DAY 10 DAYS/WEEK 7	ELECTRIC COSTS: ENERGY CHARGE \$0.0211 PER KWH DEMAND CHARGE \$11.76 PER KW
EXISTING FIXTURE DATA	REPLACEMENT FIXTURE DATA
4 FOOT 0 1 LAMP @ 48 W/FIXT = 0 WATTS 0 1 LAMP @ 37 8 W/FIXT = 0 WATTS	4 FOOT 01:LAMP @ 37 W/FIXT = 0 WATTS
96 W/FIXT = 5 75.6 W/FIXT = 144 W/FIXT =	61 LAMP W/ 37 W/FIXT = 222 WATTS REFLECTORS 021 AMP W/ S8 W/FIXT = 0 WATTS
192 W/FIXT = 240 151.2 W/FIXT = 240	SS W/FIXT = 77
2 FOOT 0.1 LAMP @ 31 W/FVT ≈ 0 WATTS 0.4 LAMP @ 88 W/FIXT = 0 WATTS	2 FOOT 0.1 LAMP @ 24 W/FIXT = 0 WATTS 0.22 LAMP W/ 41 W/FIXT = 0 WATTS
0.2 LAMP U @	NE-LECTORS ©2:LAMP U @ 58 W/FIXT = 0 WATTS
8 FOOT 0.2 LAMP @ 180 W/FIXT = 0 WATTS 0.2 LAMP @ 168 W/FIXT = 0 WATTS	8 FOOT 58 W/FIXT = 0 WATTS HEPLECTORS
TOTAL EXISTING KW . 24.6	TOTAL REPLACEMENT KW 7.5
NET ENERGY SAVINGS 212,4 MBTU/YR	NET DOLLAR SAVINGS \$3,733.97

FORT CA	FORT CAMPBELL ENERGY SAVINGS OPPORTUNITY SURVEY ECO 5: INDOOR/OUTDOOR LIGHTING EFFICIENCIES TO RECOMMENDED LEVELS 31 AUGUST 1883	EY PAGE 2 OF 2
	EXIT SIGN REPLACEMENT - INCANDESCENT TO LED	
BUILDING #: \$202		
# EXIT SIGNS	T ELECTRIC COSTS:	
CURRENT WATTAGE	40	
REPLACEMENT WATTAGE	3 JEMANU CHANGE \$11,78 FEH NW	
HOURS/YEAR		
NET ENER(NET ENERGY SAVINGS 7.74 MBTU/YR NET BOLLAR SAVINGS \$8	\$84.58

ENERGY SAVINGS OPPORTUNITY SURVY FT CAMPBELL, KY ECO-5: BUILDING 3202

Contract No: 27-93-C-0096

Prepared By: Systems Corp
Estimator: Keith A. Derrington
Estimate Prep. Date: 08/31/93

Current UPB/CSI ID: ORL290

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:36

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AA. ELECTRICAL.

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U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

DETAIL PAGE 1

TIME 11:01:36

ETAILED ESTIMATE

1. BUILDING TO THE 5 FOOT LINE / AA. ELECTRICAL

BASE BID

CTRICAL	QUANTITY UON CREW	naner	LABOR	EQUIPMENT	MATERIAL	SALESTX	DIRECT \$
	TRONIC BALLAST						
•		0.54	17.84 107	0.07 0			146.01 876
							162.29 20,287
SURFACE OR PENDANT MOUNTED							
LED EXIT SIGN W/ BATTERY	*** UNIT COSTS: *** 7.00 EA EELEA	1.25	41.26 289	0.00	121.45 850		168.79 1,181
16 ELECTRICAL		86	2,823	10	18,582	929	22,344
AA. ELECTRICAL		86	2,823	10	18,582	929	22,344
1. BUILDING TO THE 5 FOOT LINE		86	2,823	10	18,582	929	22,344
		86	2,823	10	18,582	929	22,344
	j.	0	0	0	0	0	0
ENERGY SAVINGS OPPORTUNITY SURVY		86	2,823	10	18,582	929	22,344
	4 FT 1 LAMP PARABOLIC LOUVRE W/ REFLECTOR 4 FT 2 LAMP PARABOLIC LOUVRE W/ REFLECTOR SURFACE OR PENDANT MOUNTED	O FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** REFLECTOR 6.00 EA EELEB 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** REFLECTOR 125.00 EA EELEB SURFACE OR PENDANT MOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 7.00 EA EELEA 16 ELECTRICAL AA. ELECTRICAL 1. BUILDING TO THE 5 FOOT LINE	O FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 REFLECTOR 6.00 EA EELEB 3 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 REFLECTOR 125.00 EA EELEB 74 SURFACE OR PENDANT MOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 1.25 7.00 EA EELEA 9 16 ELECTRICAL 86 AA. ELECTRICAL 86 1. BUILDING TO THE 5 FOOT LINE 86	O FLUORESCENT - RECESSED TS ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 17.84 REFLECTOR 6.00 EA EELEB 3 107 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 19.42 REFLECTOR 125.00 EA EELEB 74 2,427 SURFACE OR PENDANT MOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 1.25 41.26 7.00 EA EELEA 9 289 16 ELECTRICAL 86 2,823 AA. ELECTRICAL 86 2,823 1. BUILDING TO THE 5 FOOT LINE 86 2,823 0 0	O FLUORESCENT - RECESSED TS ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 17.84 0.07 REFLECTOR 6.00 EA EELEB 3 107 0 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 19.42 0.08 REFLECTOR 125.00 EA EELEB 74 2,427 9 SURFACE OR PENDANT HOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 1.25 41.26 0.00 7.00 EA EELEA 9 289 0 16 ELECTRICAL 86 2,823 10 AA. ELECTRICAL 86 2,823 10 1. BUILDING TO THE 5 FOOT LINE 86 2,823 10	O FLUORESCENT - RECESSED T8 ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 17.84 0.07 122.00 REFLECTOR 6.00 EA EELEB 3 107 0 732 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 19.42 0.08 136.00 REFLECTOR 125.00 EA EELEB 74 2,427 9 17,000 SURFACE OR PENDANT MOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 1.25 41.26 0.00 121.45 7.00 EA EELEA 9 289 0 850 16 ELECTRICAL 86 2,823 10 18,582 AA. ELECTRICAL 86 2,823 10 18,582 1. BUILDING TO THE 5 FOOT LINE 86 2,823 10 18,582	0 FLUORESCENT - RECESSED TS ELECTRONIC BALLAST 4 FT 1 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.54 17.84 0.07 122.00 6.10 REFLECTOR 6.00 EA EELEB 3 107 0 732 37 4 FT 2 LAMP PARABOLIC LOUVRE W/ *** UNIT COSTS: *** 0.59 19.42 0.08 136.00 6.80 REFLECTOR 125.00 EA EELEB 74 2,427 9 17,000 850 SURFACE OR PENDANT HOUNTED LED EXIT SIGN W/ BATTERY *** UNIT COSTS: *** 1.25 41.26 0.00 121.45 6.07 7.00 EA EELEA 9 289 0 850 43 16 ELECTRICAL 86 2,823 10 18,582 929 AA. ELECTRICAL 86 2,823 10 18,582 929 1. BUILDING TO THE 5 FOOT LINE 86 2,823 10 18,582 929 86 2,823 10 18,582 929

* * * END OF DETAIL REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3202E5 4-94

CREW ID: ORL290

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:36

SUMMARY PAGE 1

PROJECT NOTES

ECO-5: INTERIOR LIGHTING

SCOPE OF WORK: EVALUATE USE OF HIGHER EFFICIENCY INTERIOR LIGHTING IN SELECTED FACILITIES AT FT CAMPBELL.

CURRENCY in DOLLARS

PROJECT ID: 3202E5 4-95

U.S. ARMY CORPS of ENGINEERS M-CACES

ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY
ECO-5: BUILDING 3202

TO ITEM AND FACILITY SUMMARY

TIME 11:01:36

SUMMARY PAGE 2

BII	ITEM 1	BUILDING TO TH	e 5 foot	LINE							BASE BID
ID	FACILITY			COST TO PRM	OVERHEAD	HOME OFC	PROFIT	BOND	OTHR FCTR	TOTAL COST	UNIT COST
λλ	ELECTRICAL		1.00 EX	22,344	10.01	0.0	7.5% 1,843	2.5 % 661	0.08	27,083	27082.65
BII	ITEN TOTAL		1.00 EA	22,344	2,234	0	1,843	661	0	27,083	27082.65
TO	AL BASE BID			22,344	2,234	0	1,843	661	0	27,083	
TO	TAL ADDITIVE			0	0	0	0	0	0	0	
TO	TAL INCL ADD			22,344	2,234	0	1,843	661	0	27,083	

JECT CWE SUNHARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:36

SUMMARY PAGE 3

 ID BID ITEM	QUANTITY UON	BASE BID	ADDITIVE	TOTAL COST	UNIT COST
1. BUILDING TO THE 5 FOOT LINE	1.00 EA	27,083		27,083	27082.70
TOTAL CURRENT CONTRACT COST	•	27,083	0	27,083	
Cost Growth from 08/93 to 08/94 Index Values: 0000 0000	0.0%	0	0	0	
ESCALATED CONTRACT COST	•	27,083	0	27,083	
Government-Furnished Property		0		0	
SUBTOTAL	•	27,083	0	27,083	• ,
Contingencies	10.0%	2,708	0	2,708	
SUBTOTAL		29,791	0	29,791	
SIOH (S&A)	5.0%	1,490	0	1,490	
CURRENT WORKING ESTIMATE	•	31,281	0	31,281	
COLUMN NORTH DEVIANTE		02,000			
Estimated Construction Time	365 Days				

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3202E5 4-97

NTRACTOR DIRECT SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:3e

SUNNARY PAGE

ID	CONTRACTOR	PH	QUANTITY UON				MAT W/TX			* SUBCON W/OH&P		OBTOTAL
λλ	GENERAL/PRIME		1.00 EA	86	2,823	10	19,511	22,344	100.0%		0	22,344
	TOTAL DIRECT			86	2,823	10	19,511	22,344	100.0			

Hon 30 Aug 1993

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY

TIME 11:01:36

SUMMARY PAGE 5

NTRACTOR INDIRECT SUMMARY

ECO-5: BUILDING 3202

ID	CONTRACTOR	PM	SUBTOTAL	OVERHEA AMOUNT			PROFIT AMOUNT				* TOTAL ANOUNT		CT ****** UNIT COST
λλ	GENERAL/PRIME		22,344	2,234	10.0%	0.0	 1,843	7.5	2.5%	0.0	27,083	100.0	27082.64
	TOTAL OVERHEAD & PROFIT			 2,234	10.0		 1,843	7.5%					

PROJECT ID: 3202E5

SI DIVISION SUNMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:3t

SUMMARY PAGE

ID CSI DIVISION	MANHOURS	LABOR	EQUIPMENT	MATERIAL		TOTAL *	
16 ELECTRICAL	86	2,823	10	18,582	929	 22,344	
TOTAL DIRECT	86	2,823	10	18,582	929	 22,344	

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3202E5

YSTEMS SUMMARY

U.S. ARMY CORPS of ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:3:

SUMMARY PAGE

ID SYSTEM	MANHOURS	LABOR	EQUIPMENT		SALES TAX	TOTAL *	-
11 INTERIOR ELECTRICAL	86	2,823	10	18,582	929	22,344	-
TOTAL DIRECT	86	2,823	10	18,582	929	22,344	

UIPHENT SUMMARY

U.S. ARMY CORPS OF ENGINEERS M-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:36

SUMMARY PAGE 8

EQUIP	DESCRIPTION	LIFE HRS			BOOK OP - EXPENSE	HRLY RATE		**** TOTA	AL **** COST
ENI20	SHALL TOOLS					1.40	1.40	7	10
ማረም እፕ. 1	PROTECT FORTPHENT HOURS							7	10

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3202E5

BOR SUMMARY

U.S. ARMY CORPS of ENGINEERS N-CACES ENERGY SAVINGS OPPORTUNITY SURVY / FT CAMPBELL, KY ECO-5: BUILDING 3202

TIME 11:01:36

SUMMARY PAGE 9

------ HRLY -- UPB *** TOTAL *** BASE OVERTH TXS/INS FRNG TRVL RATE RATE HOURS CRAFT DESCRIPTION LELEC ELECTRICIANS 20.50 0.0% 24.0% 7.49 0.00 32.91 25.79 86 2,823 TOTAL PROJECT MANHOURS 86 2,823

* * * END OF SUHHARY REPORT * * *

CREW ID: ORL290

CURRENCY in DOLLARS

PROJECT ID: 3202E5

4-103.